

Syllabus

Nanofunctional Physical Metallurgy

MME 3406/5390

Course Description:

This course teaches the underlying principles of physical metallurgy. Topics will include the structure-property relationships, crystal structures, nano-, micro- and macro- defects, solid solutions, precipitation hardening, diffusion and phase equilibria including nanophases, deformation and annealing, nucleation and growth, solidification and nanophases affecting properties.

Prerequisites: BE 2303 w/ C or better

This course is cross-listed as:

Nanofunctional Physical Metallurgy MME3406 (CRN: 14657)
Special Topics MME 5390 (CRN: 13452)

NOTE: Students will be enrolled in the lecture and both lab sections, but will be required to attend only 1 lab section. Students may choose the lab section that best accommodates their schedule; however, first preference will be given to students that have a schedule conflict. The lab sections will have a maximum enrollment of 28 students and students must keep the same lab schedule all semester.

Measurable Student Learning Outcomes:

At the completion of this course, students will have a thorough understanding of the basics of physical metallurgy. An understanding of the structure property relationship and the foundation of other upper division metallurgy courses will also be taught.

Professor:

Dr. Shalayna Smith, PE

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Phone: 747-6904

Office Hours:

Tuesday and Thursday before class. Feel free to speak with me during office hours, in the class or email me with any questions or to schedule an appointment.

Meeting Times and Places:

Lecture: Tuesday and Thursday, 10:20 to 11:50, Liberal Arts 222

Lab A: Tuesday, 1:30 to 4:20 pm, Classroom Bldg C303

OR

Lab B: Wednesday, 12:00 to 2:50 pm, Liberal Arts 307

Deliverables and Grading:

Your grade is independent of anyone else's grade; that is, I do not grade on a curve. Everyone can get an A in this course. The purpose of grading is not to rank you, but to uphold a standard of quality and to give you feedback. The final letter grade will be based on a combination of quizzes, homework assignments, lab assignments and exams. The percentages are as follows:

Homework/Lab Assignments: 20%
Quizzes: 5%
Exams: 60% (15% per exam)
Final Exam: 15%

There are also up to 5% bonus points for lecture attendance and class participation. To earn this, you must arrive at lecture on time and participate in class discussion in a constructive and prepared manner, e.g., by asking or answering questions that demonstrate that you have read and attempted to understand the material.

The nominal percentage-score-to-letter-grade conversion is as follows:

90% or higher: A
80-89%: B
70-79%: C
60-69%: D
below 60%: F

The instructor reserves the right to adjust these criteria downward, e.g., so that 88% or higher represents an A, based on overall class performance. The criteria will not be adjusted upward.

There will be four exams and a final exam. The final exam will take place on the date specified by the university. Makeup exams will be given only when you have unusual circumstances, such as illness or presenting a research paper at a conference. If you believe that you have an unusual circumstance that warrants a makeup exam, notify me as soon as possible. If you will be attending a conference or other event, you must make arrangements for a make-up exam in advance. Under any circumstances, you may be required to provide official documentation before a make-up will be administered.

NO late homework will be accepted. Homework is due at the beginning of class. Homework must be legible or it will not be graded.

Course Outline of Subject Matter:

Crystal Structure of metals, Phase Diagrams, Fe-C System, Grains, Dislocations, Vacancies, Strengthening, Diffusion and Solidification

Textbook and Other Readings:

Reed-Hill RE, Abbaschian R. Physical Metallurgy Principles. 4th edition.
Various other resources will be provided as necessary.

Cheating/Plagiarism:

Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper or reference without giving credit to the source of that information or wording: it is also not acceptable. You may not submit work for this class that you did for another class. If you are found to be cheating or plagiarizing, you will be subject to disciplinary action, per UTEP catalog policy. Refer to <http://www.utep.edu/dos/acadintg.htm> for further information.

Disabilities:

If you have a disability and need accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Schedule:

Date	Topic	Chapter	Class No
29-Aug	Introduction, Syllabus & Crystal Structures	1	1
31-Aug	Crystal Structures and Phase Diagrams	1 and 11	2
5-Sep	Phase Diagrams	11	3
7-Sep	Phase Diagrams	11	4
12-Sep	EXAMINATION No.1		5
14-Sep	Fe-C System	18	6
19-Sep	Fe-C System	18	7
21-Sep	Fe-C System	18	8
26-Sep	Fe-C System	18	9
28-Sep	Dislocations	4	10
3-Oct	Dislocations and Grains	5 and 6	11
5-Oct	EXAMINATION No.2		12
10-Oct	Vacancies	7	13
12-Oct	Annealing	8	14
17-Oct	Annealing	8	15
19-Oct	Solid Solutions	9	16
24-Oct	Solid Solutions and Precipitation Hardening	9 and 16	17
26-Oct	Precipitation Hardening	16	18
31-Oct	EXAMINATION No.3		19
2-Nov	Diffusion in Substitutional Solid Solutions	12	20
7-Nov	Diffusion in Substitutional Solid Solutions	12	21
9-Nov	Diffusion in Substitutional Solid Solutions	12	22
14-Nov	Diffusion in Interstitial Solid Solutions	13	23
16-Nov	Diffusion in Interstitial Solid Solutions	13	24
21-Nov	No Class		25
23-Nov	THANKSGIVING HOLIDAY		26
28-Nov	EXAMINATION No.4		27
30-Nov	Solidification	14	28
5-Dec	Solidification	14	29
7-Dec	Review		30
14-Dec	FINAL EXAM 10-12:45		31