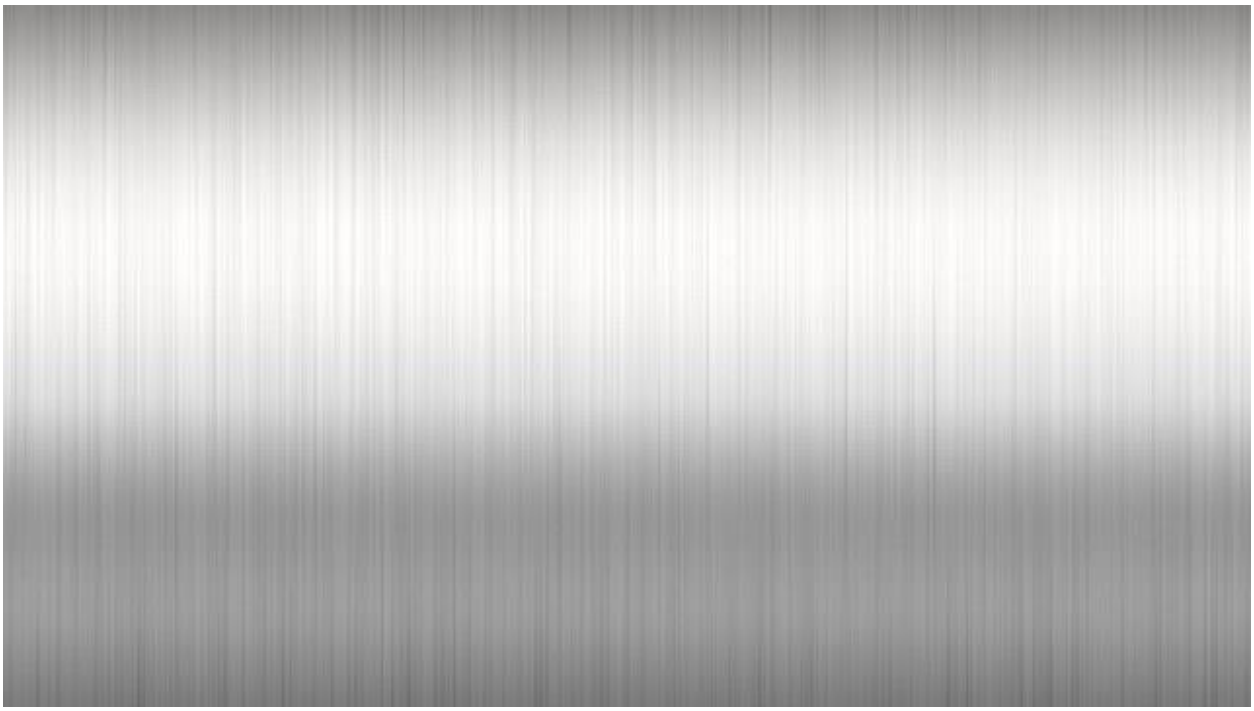
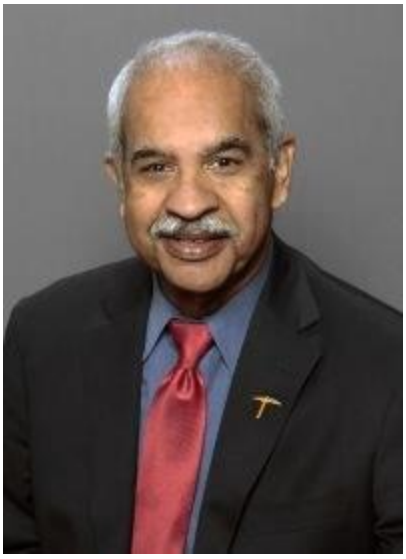


MME 3406 - Nanofunctional Physical Metallurgy

Instructor



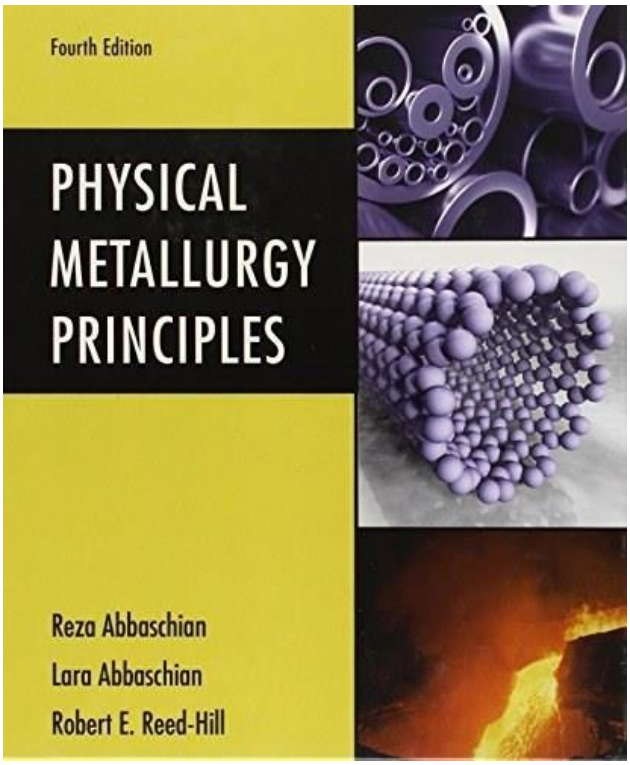
Dr. S. K. Varma

Email: skvarma@utep.edu[1]

Office: 201F Engineering Science Complex

Textbook

"Physical Metallurgy Principles" by Reza Abbaschian, Lara Abbaschian, and Robert E. Reed-Hill, Fourth Edition, Cengage Learning, 2009.



[1] mailto:skvarma@utep.edu

Lecture and Lab Hours

Lecture TR 10:30 - 11:50 MT

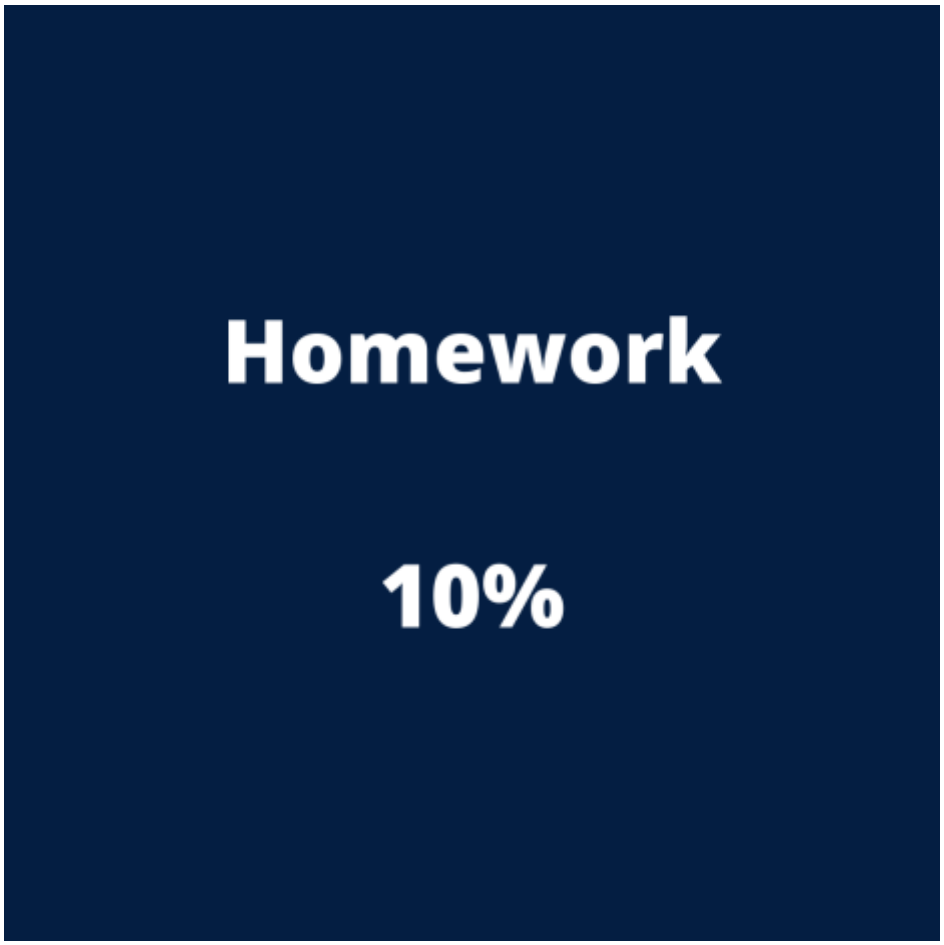
Lab T 1:30 - 4:20 MT

Lab R 1:30 - 4:20 MT

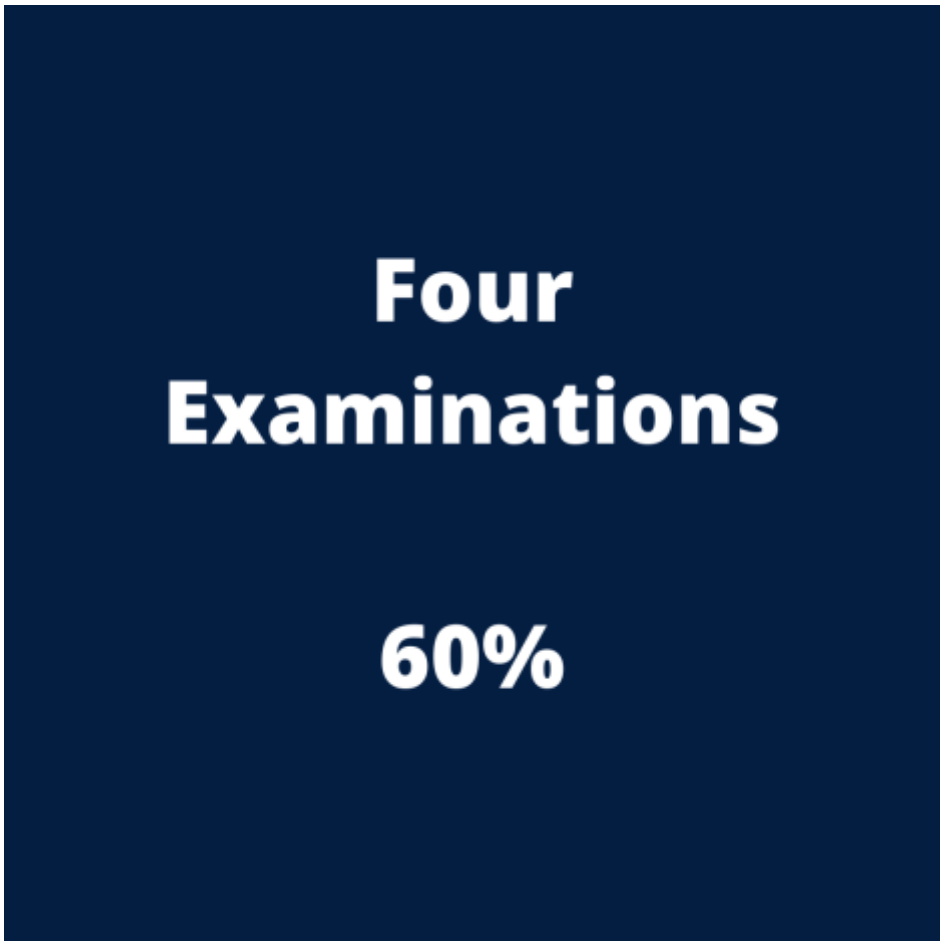
Course Outline

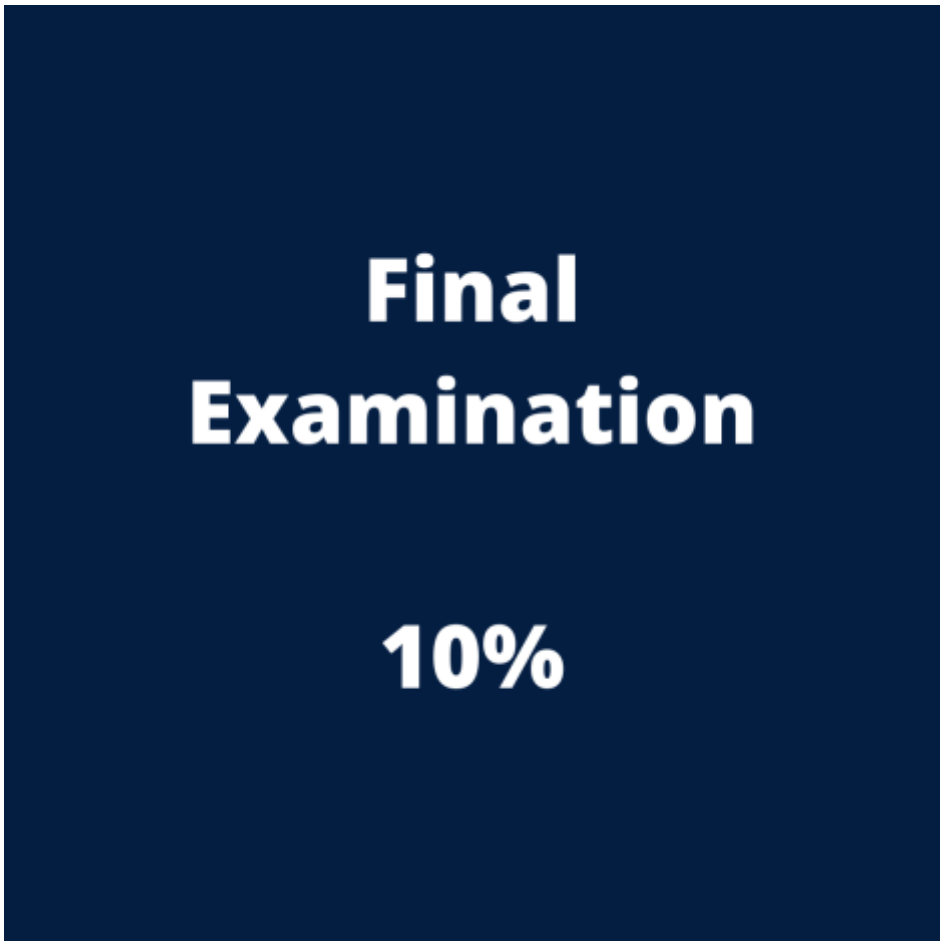
NO.	CHAPTER	DATE	TOPIC
1	1	Aug 25	Crystal Structures
X	1	25	Crystal Structures (LAB)
2	1	27	Crystal Structures
3	11	Sept 1	Phase Diagrams
X	11	1	Phase Diagrams LAB)
4	11	3	Phase Diagrams
5	X	8	**Examination No. 1**
X	11	8	Phase Diagrams (LAB)
6	11	10	Phase Diagrams
7	18	15	Fe-C System
X	18	15	Fe-C System (LAB)
8	18	17	Fe-CSystem
9	19	22	Fe-C System
X	X	X	LAB WEEK
10	19	24	Fe-C System
11	19	29	Fe-C System
X	X	X	LAB WEEK
12	X	Oct 1	**Examination No. 2**
13	5/6	3	Dislocations/Grain Boundaries
X	X	X	LAB WEEK
14	5/6	6	Dislocations/Grain Boundaries
15	5/6	8	Dislocations/Grain Boundaries
X	X	X	LAB WEEK
16	5/6	13	Dislocations/Grain Boundaries
17	8	15	Annealing
X	X	X	LAB WEEK
18	8	20	Annealing
19	8	22	Annealing
X	X	X	LAB WEEK
20	X	27	**Examination No. 3**
21	9	29	Solid Solutions
X	X	X	LAB WEEK
22	9	Nov 3	Solid Solutions
23	16	5	Precipitation Hardening
X	X	X	LAB WEEK
24	12	10	Diffusion in Substitutional Solid Solutions
25	12	12	Diffusion in Substitutional Solid Solutions
X	X	X	LAB WEEK
26	13	17	Diffusion in Interstitial Solid Solutions
27	13	19	Diffusion in Interstitial Solid Solutions
X	X	X	LAB WEEK
X	13	24	Diffusion in Interstitial Solid Solutions
28	14	26	Solidification **THANKSGIVING HOLIDAY**
29	14	Dec 1	Solidification
30	X	3	**Examination No. 4**
X	X	12	**FINAL EXAM (Thursday 10:00AM - 12:45PM)**

Grading Policy




Laboratory
20%


Four
Examinations
60%



Details of Course Outline

CHAPTER 1 (The Structure of Metals)

1.1 The Structure of Metals

1.2 Unit Cells

1.3 The Body-Centered Cubic Structure (BCC)

1.4 Coordination Number of the Body-Centered Cubic Lattice

1.5 The Face-Centered Cubic Lattice (FCC)

1.6 The Unit Cell of the Hexagonal Closed-Packed (HCP) Lattice

1.7 Comparison of the Face-Centered Cubic and Closed-Packed Hexagonal Structures

1.8 Coordination Number of the Systems of Closest Packing

1.9 Anisotropy

1.10 Textures or Preferred Orientations

19.2 Hardenability

19.3 The Variables that Determine the Hardenability of a Steel

19.4 The Austenite Grain Size

19.5 The Effect of Austenitic Grain Size on Hardenability

19.6 The Influence of Carbon Content on Hardenability

19.7 The Influence of Alloying Elements on Hardenability

19.8 The Significance of Hardenability

19.9 The Martensite Transformation in Steel

19.10 The Hardness of Iron-Carbon Martensite

19.11 Dimensional Changes Associated with Transformation of Martensite

19.12 Quench Cracks

19.13 Tempering

19.15 Spheroidized Cementite

Important Notes

1. Homework is always to be done on a standard letter size paper and only one side of the paper is to be used. The complete homework is to be stapled and not clipped or corners folded.

2. Please do not copy home work from others and if caught, both (or more) sets of home work will be given a grade of zero.

3. Questions will be asked from the students at random from the material already covered in the lectures. You must come prepared to the class for this type of discussion.

4. Absence from the class must be explained in writing (signed) otherwise it will be considered as unexcused absence. Students will be dropped from the class after 4 unexcused absences.

5. The grades on homework, weekly quizzes, lab reports and exams can only be discussed within one week after returning them in the class. It is your responsibility for collecting these immediately after my handing it out to in the class. The days of absence are included in this one-week period.

6. Homework grades can only be discussed with the TA who is responsible for grading.

7. Instructions on laboratory details will be provided to you later.

8. Again, do not copy the lab reports and make copies of the data sheets. Penalties similar to homework described above will be assessed.

9. Lectures are all online using Blackboard (BB). The nature exam format is yet to be decided. It will be explained in the lecture period. Handouts will always be posted on BB.

10. Online office hours will be announced later once the classes begin. TA will also assist you in the class.

Technology Requirements

The course content is delivered via the Internet through the Blackboard learning management system (LMS). Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Mozilla Firefox and Google Chrome are the most supported browsers for Blackboard; other browsers may cause complications with the LMS. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have or have access to a computer/laptop, scanner, a webcam, and a microphone. You will need to download or update the following basic software: Microsoft Office, Adobe, Flashplayer, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

If you encounter technical difficulties beyond your scope of troubleshooting, please contact the Help Desk as they are trained specifically in assisting with technological needs of students.

Netiquette

- Always consider audience. Remember that members of the class and the instructor will be reading any postings.
- Respect and courtesy must be provided to classmates and to instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation.

- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

Accommodations Policy

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services[2].

Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR)[3] for possible disciplinary action. To learn more HOOP: Student Conduct and Discipline[4].

[2] https://www.utep.edu/student-affairs/cass/ada-policies/accommodations-for-individuals-with-disabilities .html
[3] https://www.utep.edu/student-affairs/osccr/
[4] https://www.utep.edu/hoop/section-2/student-conduct-and-discipline.html