

METE 327 Intro. to Physical Metallurgy Spring 2012
Tues. & Thurs. 9:30 – 10:45 a.m. Jones Annex 104

Instructor: Dr. T. David Burleigh, Professor, Materials & Metallurgical Engineering
Email: burleigh@nmt.edu, Phone: (575) 835-5831, Office: old Jones Hall 114.

Textbook: R. Abbaschian, L. Abbaschian, and R. Reed-Hill, Physical Metallurgy Principles, 4th Ed. (2009) CENGAGE Learning, Stamford, CT, ISBN-13: 978-0-495-08254-5, ISBN-10: 0-495-08254-6

Catalog Description: METE 327, Intro to Physical Metallurgy, 3 cr, 3 cl hrs, *Prerequisites:* *MATE 202* Mechanism of deformation and fracture in metals. Binary phase diagrams. Phase transformations, age hardening, heat treatment of steels, TTT diagrams, CT diagrams, martensitic transformation, shape-memory effects. Common ferrous and non-ferrous alloys.

Homework & Class Attendance:

Attending the lectures and completing the homework assignments are both essential for a good grade. The exams and quizzes will be based on my lectures and the homework. The homework assignments (23% of grade) will be due on Thursdays in class. Late homework will be accepted until the next day (Friday), by 2:00 p.m. (but it is a good idea to complete the homework's before the Thursday exams). Unexcused homework turned in after Friday will loose half credit. You may discuss the homework with your fellow students, but please do your own work so that you will be able to work the exams. The homework solutions will be posted at: <http://infohost.nmt.edu/~burleigh/METE327.htm>.

Grading:

Your final grade will be based on the following weighted distribution:

Homework	23%
Exam #1	18%
Exam #2	18%
Exam #3	18%
Exam #4	18%
Team Quizzes	5%

Your final letter grade will be based on the following scale:

90-100% = A 80-89% = B 70-79% = C 60-69% = D <60% = F

I reserve the right to lower this scale to improve the grades, and assign pluses and minuses.

METE 327 “Physical Metallurgy” course outline. This class is based on the textbook:
 R. Abbaschian, L. Abbaschian, and R. Reed-Hill, Physical Metallurgy Principles, 4th ed. (2009).

Lecture #	Date 2012	Tentative Chapter & Lecture Topic:	Homework due Thursdays
1	1/17	Chapt. 1: structure of metals	
2	1/19	Chapt. 2: characterization techniques	
3	1/24	Chapt. 3: crystal binding	HW#1 (due 1/26)
4	1/26	Team Quiz #1	# 1.5, 1.8, 1.13, 2.2, 2.6, 2.7
5	1/31	Chapt. 4: Intro to dislocations	HW#2 (due 2/2)
6	2/2	Chapt. 5: plastic deformation	# 3.2, 3.9, 3.10, 4.1, 4.5, 4.7
7	2/7	Review	HW#3 (due 2/9)
8	2/9	Exam #1	# 5.3, 5.5, 5.8, 5.14, 5.20
9	2/14	Chapt. 6: grain boundaries	HW#4 (due 2/15)
10	2/15	Chapt. 7: vacancies	# 6.1, 6.2, 6.3, 6.5, 6.6
11	2/21	Chapt. 8: annealing	HW#5 (due 2/23)
12	2/23	Team Quiz #2	# 7.1, 7.3, 7.9, 8.2, 8.5, 8.6
13	2/28	Chapt. 9: solid solutions	HW#6 (due 3/1)
14	3/1	Chapt. 10: phases	# 8.9, 8.11, 9.1, 9.5, 9.7, 9.9
15	3/6	Chapt. 11: phase diagrams	HW#7 (due 3/8) # 10.1, 10.3,
16	3/8	Exam #2	10.8, 11.1, 11.4, 11.8
	3/13 3/15	no classes – Spring Break	
17	3/20	Chapt. 12: substitutional diffusion	HW#8 (due 3/22)
18	3/22	Chapt. 13: interstitial diffusion	# 11.7, 12.1, 12.2, 12.3, 12.7
19	3/27	Chapt. 14: solidification of metals	HW#9 (due 3/29) # 13.3,
20	3/29	Team Quiz #3	13.6, 13.7, 14.2, 14.3, 14.4
21	4/3	Chapt. 15: nucleation & growth kinetics	HW#10 (due 4/5) # 14.6,
22	4/5	Chapt. 16: precipitation hardening	14.8, 15.1, 15.2, 15.3, 15.9
23	4/10	Chapt. 17: deformation twinning	HW#11 (due 4/12) # 16.1,
24	4/12	Exam #3	16.4, 16.6, 17.2, 17.7, 17.8
25	4/17	Chapt. 18: iron-carbon alloy system	HW#12 (due 4/19) # 18.1,
26	4/19	Chapt. 19: hardening of steel	18.3, 18.5, 18.9, 18.12 18.14
27	4/24	Chapt. 20: nonferrous alloys	HW#13 (due 4/26) #19.1,
28	4/26	Chapt. 21: failure of metals	19.2, 19.5, 20.2, 20.4, 20.5
29	5/1	Review and powder metallurgy	HW#14 (due 5/3) #20.6, 20.8,
30	5/3	Team Quiz #4	20.13, 21.2, 21.4, 21.6
	TBA	Exam #4	