



EGR221 - Materials Science Fall Semester, 2015



EGR221 – Materials Science at UP

NGC221 – Galaxy in Andromeda

"Find the gift God gave you. Sharpen, hone, and train it. And, then go use it. Go!"

-Donald P. Shiley '51

Course Instructor: Kenneth E. Lulay, Ph.D., P.E.

Office: Shiley Hall, 236. Ph: 503-943-7432. e-mail: lulay@up.edu

Office Hours: Monday: none scheduled, Tuesday: 10:00-12:00, Wednesday: 12:00-1:00, Thursday 11:00-12:00, Friday: 12:30-1:30, and whenever I am free in my office.

Course Description: Provides a fundamental understanding of the principles of materials science as they apply to typical engineering materials. Includes consideration of atomic bonding, crystal structures, phase transformations, and mechanical properties.

Number of Credits: 3

Class Schedule: TR 12:55-2:20

Prerequisites: CHM207

Textbook: Askeland and Wright, *The Science and Engineering of Materials*, Cengage Learning, Boston, Massachusetts, 7th ed., 2016.

Website: Assignments will be posted on the course website, and solutions will be posted after the assignment is due. <http://faculty.up.edu/lulay/egr221/egr221.html>

Notebook: Organizational skills are an essential part of engineering. When called upon, engineers ***must*** be able to produce work that they performed years prior and they ***must*** be able to understand that work as well as the day they did it. Therefore, you will be required to maintain a course notebook to keep all class related information in: syllabus, list of assignments and their due dates, returned course work (assignments and exams) and course notes. You may use any form of "notebook" (spiral, 3-ring, etc.) and may have a separate notebook for taking notes. But all course related work must be **well organized**.

Communication: The number one consistent message we hear from employers is that they seek individuals with good communication skills. Listening and staying informed is a critical element of effective communication. Therefore, students are responsible for regularly checking and acting upon messages sent to their University e-mail. And of course, attending and paying attention in class.

Solutions: Homework is assigned to help you learn – therefore, don't just "do the work", understand it. Attending class and asking questions may or may not be sufficient to do well on exams (usually not). Real/deep learning will mainly occur by "getting your hands dirty" (doing the work). After each assignment has been submitted the solutions will be posted on

the course web page. Students are **HIGHLY** encouraged to review all problems and to understand the correct methodology.

Course Outcomes:

Outcome:	ASSESSMENT
Demonstrate ability to apply knowledge of science and engineering in the context of material science and material behavior.	Examinations and weekly homework
Demonstrate appropriate use of materials science terminology and vocabulary.	Examinations and weekly homework
Demonstrate solve materials related engineering problems.	Examinations and weekly homework

Professional Responsibility: students are expected to practice professional behavior: always do your best – work through and understand 100% of the assigned work, do your own work and work on teams appropriately, no cell phones in class, no reading newspapers and other unrelated materials in class, and arrive on time (BEFORE class begins) and be ready to participate as soon as class begins. And of course...ask questions when needed!

Policy on Exams: I fully expect students to study together PRIOR to the exams, but once the exam starts, no “assistance” in any manner will be tolerated (you can always ask the instructor for clarifications). NO MAKEUP exams will be given. If you cannot attend an exam for a legitimate reason, please contact the instructor to arrange to take the exam in advance.

Policy on late assignments All assignments are due at the end of the day on the pre-specified due day. Assignments will not be accepted after that. This policy may be waived for extenuating circumstances. A two-day extension will be granted once in the semester for each student – you must notify the instructor via email before class if you wish to receive an extension.

Topics Covered:

<u>Subject:</u>	<u>Week</u>	<u>Subject:</u>	<u>Week</u>
Review and Introduction	1	Temperature effects (Ch 7)	9
Crystal Structure (Ch 3)	2-3	Phase Diagrams (Ch 10-11)	10-11
Solidification, Imperfection (Ch 4)	4	Metal Alloys (Ch 13-14)	12-13
Diffusion (Ch 5)	5	Polymers (Ch 16)	13
Mechanical Props (Ch 6)	6-8	Ceramics (Ch 15)	14

<u>Grading:</u>	5 Mid-Term Exams:	15 pts each*
	Final Exam:	15pts*
	<u>Learning Exercises</u> (homework)	20pts
	Total Pts:	100pts

*Note: The worst exam grade will weighted less than the other exams (the reduced exam will be worth 5%). Students with a straight average midterm exam score of 93% or higher do not need to take the final exam if they maintain 100% attendance after the 5th exam. They will automatically receive 100% for the final. Note that the final will be of substantially different format than the mid-term exams and it will be comprehensive.

At the completion of the course, the total weighted averages from the above distributions will be combined into a letter grade according to the following scale:

Above 90%	A range (A- to A)
80% to 90%	B range (B- to B+)
70% to 80%	C range (C- to C+)
60% to 70%	D range (D- to D+)
Less than 60%	F

Grading Criteria for Exam Problems

NOTE: unclear methodology on exams, regardless of the answer may result in a significantly reduced grade, depending upon instructor's judgment. So your work should always be clear.

UNIVERSITY-WIDE POLICIES:

University's Code of Academic Integrity	<i>Academic integrity is openness and honesty in all scholarly endeavors. The University of Portland is a scholarly community dedicated to the discovery, investigation, and dissemination of truth, and to the development of the whole person. Membership in this community is a privilege, requiring each person to practice academic integrity at its highest level, while expecting and promoting the same in others. Breaches of academic integrity will not be tolerated and will be addressed by the community with all due gravity. (Taken from the University of Portland's Code of Academic Integrity.)</i>
University's Assessment Disclosure Statement	<i>Student work products for this course may be used by the University for educational quality assurance purposes.</i>
University's Disabilities Statement	<i>If you have a disability and require an accommodation to fully participate in this class, contact Accessible Education Services (AES), located in Buckley Center 163, as soon as possible. If you have an AES Accommodation Plan, you should make an appointment to meet with me to discuss your accommodations. Also, you should meet with me if you wish to discuss emergency medical information or special arrangements in case the building must be evacuated.</i>
Green Dot Statement	<i>University of Portland Faculty, Staff, and Students are committed to creating a community free from interpersonal violence, in which all members feel safe and respected. Each of us has a personal responsibility to reject violence or intimidation of any kind. Resources for those experiencing or wishing to report violence can be found on our Community Against Violence website: http://www.up.edu/cav.</i>
Learning Commons (if applicable to the course)	<i>The Learning Commons, located in Buckley Center 163, houses the Writing Center, Math Resource Center, Speech Resource Center, Group Process assistants, and the International Language Lab. Furthermore, the Learning Commons can assist students with learning strategies regarding reading comprehension, note-taking, studying skills, time-management, and test-taking.</i>