**ENGR 3450.001, Engineering Materials** Fall 2025

**Pre-requisite- PHYS 1710, CHEM 1410/1430 or CHEM 1415/1435** Time: 11:30 AM-12:50 PM TR

 Meeting Place: Room E264

Instructor: Seifollah Nasrazadani, Ph.D.

Office: Discovery Park A154

Office Hours: Tuesdays and Thursday 10:30 -11;30 AM

Phone: 940- 565-4052

Email: nasr@unt.edu

**Course Description:**

4 Credit hours (3 credit hours lecture and 1 credit hours laboratory) that includes Interrelationships of processing-microstructure-properties-performance in solid materials; diffusion laws and heat treatment of engineering alloys; the principles of materials microstructure characterization and mechanical testing; materials selection methodologies for mechanical systems design; fundamental knowledge for evaluation and analysis of materials failure and corrosion.

Prerequisites: ENGR 2332 and PHYS 1710. CHEM 1410/PHYS 1430 or CHEM 1415/CHEM 1435.

**Course Objectives**

*By the end of the course, you be able to:*

* Understand the concepts related to processing and performance of engineering materials.
* Understand the relationship between structure-processing-properties for selection of existing materials and development of new materials.
* Understand the microstructure characteristics, materials formation, and manipulation of microstructure for application in engineering design and materials processing.
* Understand the relations between the composition, temperature and phase amounts applied to equilibrium phase diagrams.
* Learn numerical solutions for properties and characteristics of the given material.

**Student Learning Outcomes**

1. Demonstrate the effect of materials microstructure in the atomic scale on the engineering properties of materials.

2. Analyze materials microstructure in the design of materials processing to obtain required properties.

3. Analyze crystalline structures and calculate Miller Indices, packing factor and density of selected unit cells.

4. Analyze strengthening by strain hardening solid solution and grain size reduction, and use of Hall Petch relation.

**Course Requirements:**

Attendance – Attendance is mandatory. Bonus questions in the exams may or may not be covered in the textbook. Missing classes may limit your ability to take full advantage of Bonus questions. Lectures, videos, and class discussions will contain vital information needed to do well on the exams. This course provides opportunities for students to take advantage of one or more of several software packages supported by the department in the classroom, homework assignments.

**Required text**:

**The Science and Engineering of Materials,** by Donald Askeland, and Wendelin J. Wright, 7th Edition, 2016, Publisher: Cengage Learning Boston, MA, ISBN: 978-1-305-07676-1.

Exams: There will be two exams (each worth 100 points) and a final exam worth 100 points. Exams will be based on text readings, handouts, class exercises, videos, and class lectures and discussions. Students are responsible for all text material, regardless of whether we review the text material in class or not.

Missed Exams: You will be allowed to make up a missed exam only if you have a documented university excused absence. If you know in advance that you will miss an exam, you MUST contact me before the scheduled exam. Make-up exams will not contain the same questions.

25% of your semester grade is assigned to laboratory part of the course and the remaining 75% will be normalized based on the following:

 Exam #1 100 points

 Exam #2 100 points

 Homework 100 points

 Comprehensive Final Exam 100 points

 **Total 400 points**

 Lowest Exams grade can be replaced with Final Exam grade

**Grade Distribution**

360 - 400 = A; 320 - 359 = B; 280 - 319 = C; 240 - 279 = D; Below 240 = F

**Disabilities Accommodation:**

The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940-565-4323 during the first week of class.

**Additional Policies and Procedures:**

**Cell Phones: Please remember to turn off phones prior to class**.

Extra Help: PLEASE DO NOT WAIT UNTIL THE LAST MINUTE. If you are having trouble with this class, please come by my office during office hours. I am also available by email at nasr@unt.edu

The Student Perception of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught.  I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider the SPOT to be an important part of your participation in this class.

This syllabus is subject to change at any time during the semester with changes to be announced during the class hours and will be posted on canvas.

**Tentative course schedule: I request your full cooperation to keep up with this schedule to gain most from this course.**

**Date Topic**

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8/19 Introduction/orientation (1-1 through 1-6)

8/21 2-1 through 2-6

8/26 3-1 through 3-4

8/28 3-5 through 3-7

9/2 3-9

9/4 4-1 through 4-4

9/9 4-5 through 4-8

9/11 Review

9/16 Exam #1

9/18 5-1 through 5-6

9/23 5-7 through 5-9

9/25 6-1 through 6-5

9/30 6-6 through 6-12

10/2 7-1 through 7-6

10/7 7-7 through 7-11

10/9 8-1 through 8-9

10/14 10-1 through 10-8

10/16 Review

10/21 Exam #2

10/23 11-1 through 11-6

10/28 12-1 through12-7

10/30 12-8 through 12-11

11/4 13-1 through 13-5

11/6 13-7 through 13-11

11/11 14-1 through 14-6

11/13 16-1 through 16-5

11/18 16-6 through 16-10

11/20 23-1 through 23-5

11/25 Thanksgiving – No class

11/27 Thanksgiving – No class

12/2 23-6 through 23-9

12/4 Review (Pre-Final Day – No new assignment)

12/9 Final Exam 10:30-12:30