The Engineering Technology Department, in cooperation with the Office of Disability Accommodation, complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request to the instructor prior to the fourth day.

SAFETY CATEGORY: 2

Name: Dr. Seifollah Nasrazadani
Title: Associate Professor
Office Room Number: F115N
Phone Number: 940-565-4052
Email: nasr@unt.edu
COURSE NUMBER, TITLE, CREDIT HOURS:

MFET 3450, Engineering Materials, 3 credit hours

PREREQUISITES:

MFET 1220, GNET 2060, MATH 1710, CHEM 1420/1440

GENERAL DESCRIPTION:

Principles of bonding, structure, and structure/property relationships for metals and their alloys, ceramics, polymers and composites. Emphasis on properties and how processes change structure and, consequently, properties.

COURSE GOALS/OBJECTIVES

1. Understand the concepts of atomic bonding, crystal structures, imperfections, diffusion, mechanical properties, electron energy, and dislocations as related to processing and performance of engineering materials. a,b
2. Understand the relationship between structure-processing-properties for selection of existing materials and development of new materials in the design of parts, structures, and devices. a,b,c
3. Understand the microstructure characteristics, electronic properties, materials formation, and manipulation of microstructure for application in engineering design and materials processing. a,b
4. Understand the relations between the composition, temperature and phase amounts applied to equilibrium phase diagrams for given material systems. a,b
5. Apply numerical solutions with clear insight into the basis for the selected solution for properties and characteristics of the given material using materials property data. a,b

LEARNING OUTCOMES (Course Objectives Supported)

1. Demonstrate an ability to analyze crystalline structures, and calculate Miller Indices, packing factor and density of selected unit cells, non-crystalline behavior, and anisotropy (Objective 1).
2. Show application of materials microstructure in the design of materials processing to obtain required properties (Objectives 2, 3, 5).
3. Demonstrate the effect of materials microstructure in the atomic scale on the engineering properties of materials (Objectives 2, 3).
4. Demonstrate an ability to analyze strengthening by strain hardening, solid solution and grain size reduction, and use of Hall-Petch relation. (Objectives 2, 3, 4).
5. Develop an experiment to characterize materials properties for an engineering application (Objectives 2, 3, 4, 5).
6. Write a report presenting the result of an experiment and a design question (Objectives 2, 3, 4, 5)
7. Make an oral presentation of # 6 (Objectives 2, 3, 4, 5).

**COMPUTER USAGE:**

Application of spreadsheet and graph-drawing software (excel), powerpoint and word processing.

**ORAL COMMUNICATION USAGE:**

Oral presentation of laboratory experiments

**WRITTEN COMMUNICATION USAGE:**

Lab reports

**LIBRARY USAGE:**

Library reference books.

**REQUIRED TEXTBOOKS:**


**SUPPLEMENTAL TEXTS AND MATERIALS:**


**TEACHING METHODS:**

Two hours lecture and three hours laboratory experiments per week.
GRADING ELEMENTS AND WEIGHTS:

GRADING SCALE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100</td>
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<tr>
<td>B</td>
<td>80-89</td>
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<tr>
<td>C</td>
<td>70-79</td>
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<tr>
<td>D</td>
<td>60-69</td>
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<tr>
<td>F</td>
<td>Below 60</td>
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GRADING POLICIES:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homeworks</td>
<td>100</td>
</tr>
<tr>
<td>Quizzes</td>
<td>150</td>
</tr>
<tr>
<td>Laboratory reports and oral presentations</td>
<td>250</td>
</tr>
<tr>
<td>Exams (3 one hour exams)</td>
<td>300</td>
</tr>
<tr>
<td>Final Exam (Comprehensive)</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>

Course Requirements

1. Attendance is required for class hours and laboratory.
2. No make-up exams will be given for the scheduled exams, unless the student has a legitimate excuse documented properly (e.g., letter from court clerk that he/she must appear in a court, letter from physician that he/she is sick). No make-up on quizzes
3. Homework assignments will be selected from the textbook and other reference books. Assignments will be collected on the due date when you arrive to the class. No late homework will be accepted except in a very unusual situation.
CLASS POLICIES:

1. All rules relating to academic dishonesty will be enforced in accordance with University policies.

2. State common law and federal copyright laws protect my lectures. They are my own original expression and I record them at the same time that I deliver them in order to secure protection. Whereas you are authorized to take notes in class thereby creating a derivative work from my lecture, the authorization extends only to making one set of notes for your own personal use and no other use. You are not authorized to record my lectures, to provide your notes to anyone else or to make any commercial use of them without express prior permission from me.

3. This syllabus is subject to change at any time during the semester with changes to be announced in class.

4. Students should schedule at least one hour per lecture hour for study outside class. Students should schedule at least one hour per laboratory hour for outside work to prepare for the laboratory, use of open laboratory hours, and to complete the required laboratory documentation.

5. Grades are based in part on the student's ability to communicate. Good written English is expected in all course work and is a factor in laboratory report grades. The student’s ability to orally communicate the results of laboratory exercises and class assignments is also monitored.

6. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.

7. Requests for review of graded work must be submitted during the lecture in which such work is returned to the students. The request should be accompanied by a written justification of the request including any supporting data.

8. The UNT Catalog procedures on cheating and plagiarism will be vigorously enforced. It is the duty of each student to protect their work so it is not available to others for submission as their efforts. This is especially true of files that are generated on the computer. Students that knowingly allow others to use their work are partners in this unethical behavior.

9. There is no limit on the use of calculators for lecture, labs, pop quizzes, formal tests, or final examination.
10. Challenges to the course grade must be presented within 60 days of receipt of grade notices mailed by the university. This will insure that instructor’s records are still available to allow a review of the assigned grade. You should first discuss your complaint with the instructor. If you wish to carry it further, contact the Program Coordinator by calling (940) 565-2022. To further pursue your complaint, contact the Department Chair at (940) 565-2022, but ONLY after first discussing your concern with the previous two individuals.

11. If appropriate, Material Safety Data Sheets (MSDS) are maintained on file in the department for your review. Access to these documents may be provided by the:
   • instructor of this course,
   • Program Coordinator, or
   • Department Secretary.
Seek initial access through the instructor or Coordinator rather than the secretary.

12. Cheating on quizzes, examinations and laboratory assignments, and plagiarism on various papers and reports are types of disciplinary misconduct for which penalties are assessed under the UNT Code of Student Conduct and Discipline. Major responsibility for implementing the University's policy on scholastic dishonesty rests with the faculty. Be advised that the instructor of this course supports and fully implements this policy. The following actions will be taken when evidence of such misconduct is observed. The student will be presented with the evidence of misconduct and given an opportunity to explain same. Based on the outcome of this private conference, the matter will be either dropped or the student will be given a grade of "F" in the course and be referred to the Dean of Students for further counseling and/or disciplinary action.

13. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
A List of Basic Safety Rules

1) When you handle chemicals wear eye protection (chemical splash goggles or full face shield).
2) When you work with furnaces for heat treatment procedures or other thermally activated equipment you should use special gloves to protect your hands.
3) Students should wear durable clothing that covers the arms, legs, torso and feet. (note: sandals, shorts, tank tops etc. have no place in the lab. Students inappropriately dressed for lab, at the instructors discretion, be denied access)
4) To protect clothing from chemical damage or other dirt, wear a lab apron or lab coat. Long hair should be tied back to keep it from coming into contact with lab chemicals or flames.
5) In case of injury (cut, burn, fire etc.) notify the instructor immediately.
6) In case of a fire or imminently dangerous situation, notify everyone who may be affected immediately, be sure the lab instructor is also notified.
7) If chemicals splash into someone's eyes, act quickly and get them into the eye wash station, do not wait for the instructor.
8) In case of a serious cut, stop blood flow using direct pressure using a clean towel, notify the lab instructor immediately.
9) Eating, drinking and smoking are prohibited in the laboratory at all times.
10) Never work in the laboratory without proper supervision by an instructor.
11) Never carry out unauthorized experiments. Come to the laboratory prepared. If you are unsure about what to do, please ask the instructor.
12) Always remember that HOT metal or ceramic pieces look exactly the same as COLD pieces, be careful what you touch.
13) Know the location and operation of:
   - Fire Alarm Boxes
   - Exit Doors
   -Telephones
WORK ORDER FOR LAB TECHNICIANS
Work order must be filled out completely. Leave on the door of Room 264D or give to the laboratory monitor.

Today’s Date: ________________

Equipment name & number __________________________ Room ____

Complete description of problem ________________
Was someone using when problem occurred? _____ If yes:
Who _____________________________ What class _____________

Who is reporting problem? ________________________________
(Faculty Member or TA)

------------------------------------------------------------------------------------------------------------
For Office Use Only

Date received: _______________

Repairs by: ________________ Date returned to service: ________________

Comments:
### Course Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/15/04</td>
<td>Orientation/ Chapter 1</td>
<td>No Lab</td>
</tr>
<tr>
<td>1/22/04</td>
<td>Atomic Structure/Crystallography</td>
<td>No Lab</td>
</tr>
<tr>
<td>1/29/04</td>
<td>XRD</td>
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<tr>
<td>2/5/04</td>
<td>Defects in Materials</td>
<td>Metallography</td>
</tr>
<tr>
<td>2/12/04</td>
<td>Diffusion</td>
<td>Metallography</td>
</tr>
<tr>
<td>2/19/04</td>
<td>Diffusion</td>
<td>Exam #1</td>
</tr>
<tr>
<td>2/26/04</td>
<td>Mechanical Properties of Materials</td>
<td>Tensile Test</td>
</tr>
<tr>
<td>3/4/04</td>
<td>Solid Solution/ Phase Equilibria</td>
<td>Hardness Test</td>
</tr>
<tr>
<td>3/11/04</td>
<td>Dispersion Strengthening</td>
<td>Age Hardening</td>
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<tr>
<td>3/18/04</td>
<td>Phase Transformation</td>
<td>Heat Treatment</td>
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<tr>
<td>3/25/04</td>
<td>Ferrous alloys</td>
<td>Exam #2</td>
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<tr>
<td>4/1/04</td>
<td>Nonferrous alloys</td>
<td>Ductile/Brittle Transition</td>
</tr>
<tr>
<td>4/8/04</td>
<td>Polymers</td>
<td>Corrosion</td>
</tr>
<tr>
<td>4/15/04</td>
<td>Ceramics</td>
<td>No Lab.</td>
</tr>
<tr>
<td>4/22/04</td>
<td>Composites</td>
<td>Exam #3</td>
</tr>
<tr>
<td>4/29/04</td>
<td>Failure Analysis</td>
<td>Scanning Electron Microscopy</td>
</tr>
</tbody>
</table>

5/6/04  ------------------------------Final Exam-----------------------------