

## Syllabus for MAE 3324 – 001 Fall 2015

**Instructor's Name:** Nancy Michael

**Office:** 204C Woolf Hall

**Office Hours:** 12:30 – 1:30 Tuesday/Thursday

**Course Number, Section and Title:** MAE 3324 – 001, Structure and mechanical behavior of materials

**Time and Place of Class Meetings:** Woolf Hall 311, T,Th, 9:30 – 10:50 am, Aug 27 – Dec 10, 2015

Final Exam: Dec 17.

**Office Telephone Number:** 817-272-1258

**Email Address:** michael@uta.edu

**Description of Course Content:** This course introduces the interrelationships between processing, structure (crystal and microstructure) and mechanical and chemical properties of engineering materials, with emphasis on the mechanical behavior of metals, polymers and composite materials.

The Material covered will include the following sections of the textbook. Students are responsible for material in these sections and lecture content.

1.1-6	Introduction
2.1-8	Atomic Structure and Atomic Bonding
3.1-6, .9 -.21	Structure of Metals and Ceramics
4.1-12	Polymer Structures
5.1-13	Imperfections in Solids
6.1-7	Diffusion
10.1-15, .19 -.21	Phase Diagrams
11.1-17	Phase Transformations
7.1-20	Mechanical Properties
8.1-19	Deformation and Strengthening Mechanisms
9.1-5, .7-16	Introduction to Failure Mechanisms
15.1-10	Composites

**Student Learning Outcomes.** Student will be able to:

- draw common crystal structures for metals and ceramics, and identify planes and directions in them;
- identify defects in crystals and explain their relationship to mechanical properties;
- understand the principles of diffusion, Fick's first and second laws, and work simple 1-dimensional steady state and non-steady state diffusion problems;
- predict equilibrium microstructures from binary eutectic phase diagrams;
- predict equilibrium structures from the Fe-C phase diagram;
- use phase transformation principles to predict trends in microstructure development;
- list the common microconstituents of Fe-C and understand the relationship of mechanical properties to the structure of each;
- create a simple heat treatment for Fe-C using TTT diagrams to form desired final microstructure;
- fully interpret the engineering and true stress-strain diagram;
- know the principles of failure mechanisms, including fatigue, creep, and fracture, and the variables that influence each;
- name and explain principles of strengthening mechanisms in metals, and use these to predict mechanical property trends;
- explain why composites are needed, identify common applications, and explain how fillers combine with a matrix to create new property combinations.

**Requirements:** CHEM 1465, PHYS 1444, and MAE 2312 (or concurrently enrolled)

**Required Textbooks and Other Course Materials:** Fundamentals of Materials Science and Engineering, an Integrated Approach, 4th ed. William Callister and David Rethwisch.

**Class website is on Blackboard.** <http://elearn.uta.edu> Log in with your NetID and password.

HW assignments and solutions will be posted. When used for lecture, presentation slides will also be made available through the class website.

### Grading Policy:

Exam 1: 20%

Exam 2: 20%

Exam 3: 20%

Quiz: 20 %

Final Exam 20%

A:  $\geq 90\%$  of full credit

B: 80-89.9%

C: 70-79.9%

D: 60-69.9%

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**Exams:** Major exams will be closed book/closed notes. An equation sheet will be provided and can be found on the course website for review prior to exam. During exams, no caps/hats may be worn, students may not leave the classroom for any reason (no bathroom breaks), seating will be assigned, and book bags, phones, and other electronic devices must be left at the front of the room. The only electronic device which may be allowed for exams and quizzes is a scientific calculator. Phones and other unauthorized electronic devices found at the test seat (including pockets) after the exam begins will be treated as attempted cheating. **Make-up Exam Policy:** The grade for one missed midterm exam may be made up by substituting the final exam grade for the missed exam. There is no provision for a second missed midterm.

**Quiz:** Quizzes will be in two forms. In-class quizzes are generally announced, but may occasionally be unannounced. The material covered on an in-class quiz may include the day's reading assignments and previous homework or lecture material. There will be approximately one in-class quiz per week. Take home quizzes are to be done independently, using only the reference materials given. Each quiz will be graded and assigned a score up to 100%. The lowest score will be dropped and remaining quizzes will be averaged. There is no provision for a missed quiz.

### Tentative Course schedule and description of major assignments and examinations:

Exam 1: Tuesday, Sept 22

Exam 2: Tuesday, Oct 27

Exam 3: Tuesday, Nov 24

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. Specific reading and homework assignments will be given via Blackboard.

Class	Date	Day	Course Material
1	27-Aug	R	Course introduction, Chapters 1 and 2
2	1-Sep	T	Ch 3,
3	3-Sep	R	Ch 3,5
4	8-Sep	T	Ch 5,
5	10-Sep	R	Ch 5
6	15-Sep	T	Ch 4
7	17-Sep	R	Ch 4 and review
8	22-Sep	T	Exam 1
9	24-Sep	R	Ch 6
10	29-Sep	T	Ch 6
11	1-Oct	R	Ch 10
12	6-Oct	T	Ch 10
13	8-Oct	R	Ch 10
14	13-Oct	T	Ch 11
15	15-Oct	R	Ch 11
16	20-Oct	T	Ch 11
17	22-Oct	R	Ch 7 and review
18	27-Oct	T	EXAM 2
19	29-Oct	R	Ch 7
20	3-Nov	T	Ch 7
21	5-Nov	R	Ch 8
22	10-Nov	T	Ch 8
23	12-Nov	R	Ch 8
24	17-Nov	T	Ch 9
25	19-Nov	R	Ch 9
26	24-Nov	T	Exam 3
27	26-Nov	R	Thanksgiving Holiday
28	1-Dec	T	Ch 9, 15
29	3-Dec	R	Ch 15
30	8-Dec	T	Question and Answer
Final exam	17-Dec	R	8:00 -10:30 am

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**Attendance:** At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I do not take attendance, but attendance is expected. Students are responsible for material covered in lecture, homework, handouts and text.

**Classroom Etiquette:** It is rude to text, email, wear earbuds, enter class late, make excessive noise, or use your tablet or laptop for anything other than course materials during class. Doing any of these things may result in your being asked to leave the classroom.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

**Disability Accommodations:** UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: The Office for Students with Disabilities, (OSD) [www.uta.edu/disability](http://www.uta.edu/disability) or calling [817-272-3364](http://www.uta.edu/disability). Counseling and Psychological Services, (CAPS) [www.uta.edu/caps/](http://www.uta.edu/caps/) or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Title IX:** The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX).

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

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**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Grade Grievance:** Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.  
<http://catalog.uta.edu/academicregulations/grades/#undergraduatetext>

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located downstairs. Exit the room and turn left. Take the stairwell at the end of the hall down to the exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.