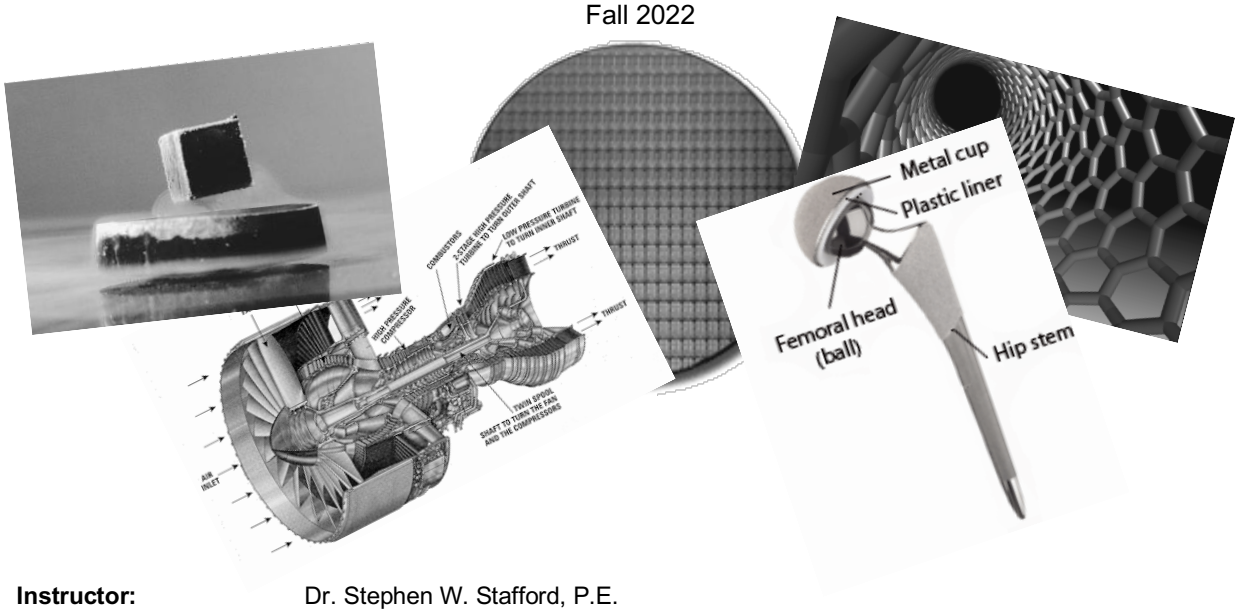
MME 2303 INTRODUCTION TO MATERIALS SCIENCE AND ENGINEERING

Course Syllabus
Fall 2022



Instructor: Dr. Stephen W. Stafford, P.E.
Office: M-201G 747-6930
e-mail: stafford@utep.edu
Office Hours: To be determined
Text: Materials Science and Engineering – An Introduction 10th edition, by William Callister

Grade: Your grade will be based on the following scheme:

Three Exams	55%
Homework	20%
Comprehensive Final Exam	25%
Total	100%

COURSE DESCRIPTION

An introduction to the properties of engineering materials and their relationships to structure, processing and behavior; materials testing and measurement of properties. Selection of materials for engineering applications considering the interrelationships between structure, properties, processing, and performance. Prerequisite: CHEM 1305 with a grade of "C" or better.

The course will be presented in sections as defined by the course outline.

PROPOSED COURSE OUTLINE

1. Introduction to Materials and Material Disasters (Chapter 1)
2. Chemical Bonding (Chapter 2)
3. Material Structures (Chapter 3)
4. Defects (Chapter 4)
5. Processing of Engineering Materials- Part I (Chapter 5)
6. Mechanical Properties of Engineering Materials (Chapter 6)
7. Material Performance (Chapters 7, 23)
8. Processing of Materials-Part II (Chapters 8-13)
9. Material Systems (Chapters 14-22)
10. Case Studies in Materials Selection and Design

Make-up Exam Policy- If you miss a regularly scheduled exam, you may take a make-up exam in accordance with the following:

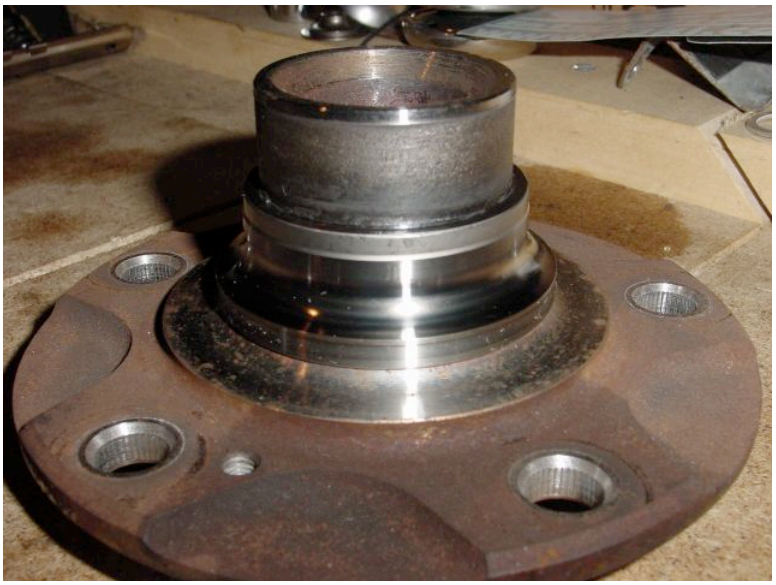
1. All make-up exams will be given on Dead Day at a time that will be announced. There will be no exceptions!
2. You can only take **one** make-up exam. So, do not miss more than one exam during the semester.
3. Every effort will be made to construct make-up exams to cover the appropriate material that was designated for the regularly scheduled exams. The length and difficulty should be comparable, although the exam structure may be different!

What will I learn?

- Atomic bonding affects the structure, properties, processing and performance of engineering materials.
- Many of the common structural materials are crystalline, which greatly influences their properties. We will also explore the properties of non-crystalline materials.
- What the common crystalline defects are and their influence.
- The relationships between crystal structure, defects, and material properties.
- The fundamentals of mechanical testing and how this data is used in engineering design.
- How to predict and control the properties of materials through processing to include solidification, plastic deformation, and heat treatment.
- The general mechanical and physical properties of industrial materials.
- Materials selection in engineering design.
- Understanding the essence of material performance in terms of service conditions which induce excessive elastic or plastic deformation, fatigue, fracture, wear and corrosion.

What do I need to do to learn these things?

- This course emphasizes concepts, which should be learned and not memorized! To learn these concepts you have to read the book, attend class regularly and take notes, review the PowerPoint slides presented on Blackboard, do the homework and study for all of the exams!
- Here is an example of a material concept: I want to fit an inner bearing race on to a shaft (see the figure below). The interference fit must be between 0.001-0.003-inches, which translates to get the race on I need to either chill the shaft (to contract it) or heat up the bearing race (expand it) in order to get it on. I could immerse the shaft in liquid nitrogen (-196^{o}C) or heat up the race to 300^{o}C; either procedure will allow us to seat the race on the shaft. But will either chilling the shaft or heating the race change their properties in any way? Knowing the influence of temperature on the physical and mechanical properties of different materials is fundamental in this example and to this course.



Can I work in a group?

- I encourage you to work together in groups to solve homework problems. Discussing topics in groups is a very effective way to learn difficult concepts. However, copying another person's work is cheating and will be treated as such.
- You must work alone when completing quizzes and exams.
- Your work must be professional! If you would be embarrassed to hand your homework to your supervisor, please do not hand it to us. Work that is deemed unprofessional will be returned ungraded.
- **Please Note**: only non-programmable calculators may be used on exams. Students who bring a programmable calculator to exams may use them only after we erase their memories.

When can I see you if I need help?

- During my posted office hours or please feel free to email me to see my availability. I check regularly. You can always make an appointment.
- Contact the TA for this class as well.

Cheating/Plagiarism: Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper or reference without giving credit to the source of that information or wording: it is also not acceptable. Do not submit work under your name that you did not do yourself. You may not submit work for this class that you did for another class. If you are found to be cheating or plagiarizing, you will be subject to disciplinary action, per the UTEP catalog policy. Refer to http://www.utep.edu/dos/acadintg.htm for further information.

Disabilities: I will make any reasonable accommodation for students with limitations due to disabilities, including learning disabilities. Please see me personally before or after class in the first two weeks or make an appointment to discuss any special needs you might have. If you have a documented disability and require specific accommodations, you will need to contact the Center for Accommodations & Support Services (CASS) in the East Union Bldg., Room 106 within the first two weeks of classes. The CASS Office can also be reached in the following ways:

Web: http://www.onthemove.utep.edu
Phone: (915) 747-5148
Fax: (915) 747-8712
E-Mail:cass@utep.edu