

The University of Texas at Arlington
Materials Science and Engineering Department and
Mechanical and Aerospace Engineering

MSE 5312/ MAE 4336

Sp. 2011

**Mechanical Behavior of Materials/ Advanced Mechanical Behavior of
Materials**

Course Mechanics

- Instructor:** Professor Pranesh B. Aswath
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Office Hours: W: 1:00 – 3:00 pm or by appointment
- Teaching Asst:** TBA (Will have office hours that will be announced in class)
- Lecture Meetings:** T, Th 2:00 - 3:20 pm
- Course Content:**
- 1) Mechanics of Materials
 - 2) Dislocation Theory
 - 3) Single Crystal Deformation
 - 4) Strengthening Mechanisms
 - 5) Fracture Mechanics
 - 6) Fatigue of Materials
 - 7) Creep of Materials

Student Learning Outcomes:

- 1) Basic Principles of Strength of Materials, Constitutive Equations, Plasticity
- 2) Origin of Defects and the characterization and mechanics of defects.
- 3) Basic Principles of Deformation of Single Crystals.
- 4) Mechanism of Strengthening of Metallic materials.
- 5) Basic Understanding of Fracture Mechanics and its application to failure mechanisms.
- 6) Fatigue of engineering materials.
- 7) Fractography and failure analysis..
- 8) Mechanism of Creep and Creep Deformation.

Text Book " Mechanical Metallurgy", 3rd Edition by George E. Dieter

Additional Reading "The Plastic Deformation of Metals", R.W.K. Honeycombe, Edward Arnold & American Society of Metals.

"Introduction to Dislocations", 3rd Edition, D. Hull and D.J. Bacon, Pergamon Press.

American With Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 - The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As a faculty member, I am required by law to provide “*reasonable accommodation*” to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with **informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels**. If you require an accommodation based on disability, I would like to meet with you in the privacy of my office during the first week of the semester to make sure that you are properly accommodated.

Academic Dishonesty

It is the philosophy of the University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

“Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.” (Regents’ Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)

My Approach to Academic Dishonesty: Academic dishonesty is completely unacceptable in the class room and I have zero tolerance for it. However, that said, the important thing in a class is the learning experience and I encourage discussion outside class hours on material that was covered in class. However, what I find unacceptable is copying other’s homework and acquiring homework from past years.

All exams will be closed book and closed notes. I will provide any equations that I believe are necessary for assisting you in working problems in the exam. You will not be allowed to bring in any external material into the exam, you will be allowed a simple calculator into the exam but not any of the programmable ones where data, equations and definitions can be stored. The calculators are meant to assist in calculation and not provide any additional advantage in an exam.

SYLLABUS

MATERIAL COVERED	SECTION
Stress-Strain Relationships for Elastic Behavior	
Mechanical Metallurgy - George E. Dieter	Chapter 2
Theory of Plasticity	
Mechanical Metallurgy - George E. Dieter	Chapter 3
Dislocations	
Mechanical Metallurgy - George E. Dieter	Chapter 5
The Plastic Deformation of Metals - Honeycombe	Chapter 3
Introduction to Dislocations-Hull & Bacon	Chapters 1,2,3, 5, 6 & 7.
Deformation of Single Crystals	
Mechanical Metallurgy - George E. Dieter	Chapter 4
The Plastic Deformation of Metals - Honeycombe	Chapter 4 & 5
Solid Solution Strengthening	
Mechanical Metallurgy - George E. Dieter	Chapter 6
The Plastic Deformation of Metals - Honeycombe	Chapter 6
Precipitation Hardening	
Mechanical Metallurgy - George E. Dieter	Chapter 6
The Plastic Deformation of Metals - Honeycombe	Chapter 7
Miscellaneous Strengthening	
Mechanical Metallurgy - George E. Dieter	Chapter 6
The Plastic Deformation of Metals - Honeycombe	Chapter 9
Fracture Mechanics	
Mechanical Metallurgy - George E. Dieter	Chapter 11
Deformation and Fracture of Engineering Materials- Hertzberg.	Chapter 8
Fracture	
Mechanical Metallurgy - George E. Dieter	Chapter 7 &14
Deformation and Fracture of Engineering Materials- Hertzberg.	Chapter 7 & 10
The Plastic Deformation of Metals - Honeycombe	Chapter 15
Fatigue	
Mechanical Metallurgy - George E. Dieter	Chapter 12
Deformation and Fracture of Engineering Materials-	

Hertzberg.

Chapter 12 & 13

Creep

Mechanical Metallurgy - George E. Dieter

Chapter 13

The Plastic Deformation of Metals - Honeycombe

Chapter 13

Deformation and Fracture of Engineering Materials-

Hertzberg.

Chapter 5