

University of California
Department of Mechanical Engineering
Mechanical Behavior of Engineering Materials (ME108)
Fall 2020

Course Content^[1] and Labs^[2]

Part I

Introduction (chapter 1)
Microstructure and Deformation of Materials (chapter 2)
Alloying and Hardening (chapter 3)
Heat Treatment (class notes)
Slip Planes, Dislocations, Twinning (class notes)
Introduction to Mechanical Testing (chapter 4)
Stress and Strain (chapter 5)
Complex Stress/Strain States (chapter 6)
Special Topics on Complex Stress States (class notes)
Yielding and Fracture Criteria (chapter 7)

Part II

Plastic Deformation (chapter 12)
Ductile and Brittle Fracture (chapter 8)
Fracture Mechanics (chapter 8, class notes)
Fatigue, Stress-based Approach (chapter 9)
Fatigue, Strain-based Approach (chapter 14, class notes)
Cumulative Fatigue Damage (class notes)
Notch Effects in Fatigue (chapter 10)
Crack Growth (chapter 11)
Time-dependent Deformation, Creep (chapter 15)

^[1]Chapters assigned for each topic are from the class text.

Labs*

Lab 1: Heat Treatment/Phase Diagrams and Indentation Hardness
Lab 2: Deformation due to Monotonic Loading and Fracture Toughness
Lab 3: Time- and Rate-Dependent Deformation
Lab 4: Deformation due to Cyclic Loading
Lab 5: Fatigue

^[2]Each lab is detailed in the lab text and is accompanied by representative results aimed to assist you in determining the validity of your tests. All of the labs will be shown in two videos: one video describing the underlying theory and basic information and another video showing how each test is conducted and how the measured data are acquired and plotted.

