

Eciv 303 Study Guide

Sources in order of importance

1. Textbook and end of chapter questions
2. Lectures
3. Content posted on web page

Topics

1. Behavior of Materials
 - a. Elastic
 - b. Elastoplastic
 - c. Viscoelastic
2. Mechanical properties
 - a. Stress-strain behavior
 - i. Linear, nonlinear
 - ii. Elastic, plastic strains
 - iii. Rheological models
 - b. Meanings of various moduli and strengths
 - i. Young's Modulus
 - ii. Shear Modulus
 - iii. Secant, Tangent Moduli
 - iv. Yield Strength
 - v. Ultimate Strength
 - c. Derived quantities such as resilience and toughness
 - d. Fatigue, Temperature effects
3. Non-Mechanical properties
 - a. Density/Unit Weight
 - b. Thermal expansion
 - i. In concrete pavements/slabs
 - ii. In high-rise buildings
 - c. Hardness
 - d. Abrasion and wear resistance
4. Material Structure
 - a. Crystal arrangements
 - b. Simple phase diagrams for two-component alloys (Binary Phase Diagram pg. 70)
 - c. Flaws
 - d. Polymer behavior

5. Measurement of Properties
 - a. Strain gage
 - b. Dial gage
 - c. Load Cell
 - d. Load (Proving) Ring
 - e. LVDT
 - f. Data acquisition
 - g. Accounting for error, non-linear response
6. Steel
 - a. Iron and steel production (Including videos)
 - b. Producing structural steel (Including videos)
 - c. Other steel products used in Civil Engineering
 - i. Reinforcing steel
 - ii. Pre-stressing steel
 - iii. Bolts and fasteners
 - d. Fabricating Steel (Including videos)
 - e. Welding (Including videos and handouts)
 - i. Methods
 - ii. Applications
 - f. Testing steel
 - i. Tension test
 - ii. Torsion test
 - iii. Charpy V-notch
 - iv. Bend test
 - v. Hardness test
 - g. No corrosion, that comes later.....
7. Application of statistics to material properties (Including handouts)
 - a. Descriptive statistics
 - b. Hypothesis testing
 - i. Z-statistic
 - ii. T-tests