

Course Topics

Review of 530.201, Statics & Mechanics

Do homework (HW#1) for review

The Fundamentals of Design (J&M 1.1-1.10)

Safety, Ecological & Societal Considerations
The Design Process
Codes and Standards

Combined Static Loading

Shear Force, Bending Moment Relations (J&M 4.1-4.6)
Combined Loading; Triaxial States (J&M 4.8-4.11)
Plane Strain; Principle Strains (J&M 5.1-5.4)
Stress-Strain Relations (J&M 5.5)
Deflection Analysis (J&M 5.6-5.7)
Pressure Vessels, rotating disks (Lecture note)
Thermal Stress; Press Fits (J&M 4.16)

Buckling

Buckling of Long Straight Columns (J&M 5.10-5.11)
Empirical Column Formulas; Design Problems (J&M 5.12-5.14)

Complex Stress States

Stress Concentrations (J&M 4.12-4.13)
The Finite Element Method (J&M 5.16)

The Specification of Dimensions (Lecture Note)

Limits & Fits; Dimensions & Tolerancing

The Specification of Materials (J&M 3.1-3.14)

Failure of Materials And Structures

Failure Theories for Static Loading (J&M 6.1-6.4)
Using Failure Theories; Fracture Mechanics (J&M 6.5-6.10)

Fatigue Failure

Fatigue Failure: Time-varying loads (J&M 8.1-8.6)
Endurance Limits, Fatigue Strength (J&M 8.7-8.11)
Fatigue Life Prediction (J&M 8.12-8.17)

Design of Fasteners And Joints

Threaded Fasteners; Preloading, Fatigue Effects (J&M 10.1-10.4)
Riveted and Bolted Joints (J&M 10.5-10.10)

Design of Helical Springs

Compression Springs (J&M 12.1-12.3)
Tension and Torsion Springs (J&M 12.4-12.12)

Selection of Bearings and Lubrication (J&M 13.1-13.13)

Friction and Wear; Regimes of lubrication
Rolling-Element Bearings

Design of Gearing (J&M 15.1-15.7)