

- SCOPE:** This course covers advanced topics in elastic and inelastic structural metal member behavior and the theoretical basis of design codes and procedures. Philosophies of design, fatigue, bending stability, torsion, stability of plates, stability of columns, stability of beam-columns, connections, and frame stability will be covered in depth in addition to other topics relating to advanced behavior and design of metal structures.
- TEXTS:** Salmon and Johnson, *Steel Structures: Design and Behavior, Emphasizing Load and Resistance Factor Design*, 4th Edition, HarperCollins College Publishers, New York, 1996
- American Institute of Steel Construction, *Steel Construction Manual, Load and Resistance Factor Design*, 13th Edition, 2005
- CE545 Course Packet available in the Engineering Copy Center
- INSTRUCTOR:** J.A. Laman, 231J Sackett Bldg., 863-0523, jlaman@psu.edu
Office Hours: M and W, 1:00 to 3:00 pm or by appointment
- LECTURES:** MWF, 11:15 to 12:05 am, Room 212 Hammond
- DESIGN PROBLEMS:** Practice design problems emphasizing concepts discussed in class are included in the course packet. Problems will not be graded, however, students are encouraged to complete the problems as reinforcement of class discussions and examination preparation. Solutions will be posted on the ANGEL site for the course.
- PROJECT** A semester steel design project will be assigned in class and is described in the course packet.
- EXAMS/
FINAL:** Two evening semester exams and a comprehensive final exam will be administered for the course. Times and dates are indicated in the course schedule.
- GRADING:** The course grade will be based on:
- 10% - Engineers Notebook
 - 15% - Design Project
 - 50% - Mid-term exams (2 @ 25%)
 - 25% - Final Examination
 - 100% - Total

The *Student Guide to General University Policies and Rules* applies to this course

CE 545 - METAL STRUCTURE BEHAVIOR AND DESIGN

Course Outline – Spring 2007

The Pennsylvania State University
Dept. of Civil and Environmental Engineering

Topic	Reading
FRAME DESIGN REVIEW	S&J Ch 12, 14
AISC Second Order Effects and Moment Magnification	AISC Spec Ch C and H
AISC Stability and Leaning Columns	
PHILOSOPHIES OF DESIGN	course notes
ASD vs LRFD and Structural Reliability	S&J Ch 1
Failure Criteria	AISC Commentary Spec Ch B
Brittle Fracture/Ductile Yielding	
Von Mises Yield Criteria	
FATIGUE	course notes
Stress Life, Strain Life, Fracture Mechanics	AISC Appendix 3
Variable Amplitude Loading and Miner's Rule	
AISC Fatigue Design Requirements	
BENDING BEHAVIOR	S&J Ch 7
General Flexural Theory	AISC Spec Ch F
Unsymmetrical Bending	
Biaxial Bending	
Tapered Members	
TORSION	S&J Ch 8
Pure Torsion	
Shear Flow	
Shear Center of Open Thin-Walled Sections	
Uniform Torsion	
Torsion of Structural Shapes	
Nonuniform Torsion	
Combined Torsion and Bending	
Torsion of Closed Thin-Walled Sections, Single Cell and Multi-Cell	
LATERAL TORSIONAL BUCKLING	S&J Ch 9
Elastic and Inelastic	
COLUMNS, PLATES, and COMPRESSION MEMBERS	S&J Ch 6
Local Buckling of Plate Elements	AISC Ch B
AISC Design Criteria (App. B)	
Torsional Compression Buckling (App. E)	
BEAM-COLUMN AND FRAME BEHAVIOR	S&J Ch 12
Approximate 2 nd order effects	AISC Commentary Spec Ch H
Elastic and Inelastic Behavior	
CONNECTIONS	S&J Ch 13
Review of Bolt and Weld Strength	AISC Part 7 through 12
AISC Design Aids	
Example	