Prerequisite: CE 340 (Structural Analysis)

Objectives:
1. To expand the student’s knowledge and understanding of the field of structural engineering, with particular emphasis placed upon designing steel structures.
2. To present methods for designing steel members and connections using the Load and Resistance Factor Design (LRFD) approach.
3. To introduce the student to the organization and use of the AISC Manual of Steel Construction
4. To develop skills in completing and checking individual component and complete structural system designs using the AISC Manual of Steel Construction.

Textbooks: Unified Design of Steel Structures, Louis F. Geschwindner


Course Packet - available at the Engineering Copy Center (PUT IN 3" BINDER AND BRING TO EVERY CLASS)

Instructor: Dan Linzell (dlinzell@engr.psu.edu, 3-8609, Twitter username: StructureLion)
231L Sackett Building (Mailbox 216 Sackett)

Office Hours: T R 10:30 a.m. - 12:30 p.m. or by appointment

Tentative Schedule:

I. Introduction to Structural Steel Design 2 classes
II. Compression Members 6 classes
III. Bending Members 6 classes
IV. Composite Beams 4 classes
V. Beam-Columns 4 classes
VI. Tension Members 3 classes
VII. Connections 3 classes
VIII. Lab Demos 2 classes
30 classes

Grading:
Exam 1 (Monday, February 21st, Time/Location TBA) 20%
Exam 2 (Monday, April 4th, Time/Location TBA) 20%
Final (Week of May 2nd, Date/Time TBA) 25%
Homework 30%
Notebook 5%
100%
Tentative Outline:

I. Introduction to Structural Steel Design

Reading:  
Geschwindner: Chs. 1 to 3  
AISC: GNRL. \rightarrow 2-4 to 2-13, SPEC. \rightarrow 16.1-1 to 16.1-9 (Ch. A),  
Commentary \rightarrow 16.1-203 to 16.1-209 (Ch. A)

- Structural Engineering - overview of the profession
- The Design Process - goals, steps
- Structural Steel - types, uses, properties, etc.
- Steel Structures
- Specifications and Codes (AISC, ANSI, AASHTO, AREA, ASCE7, etc.)
- Loads, Load Factors, Load Combinations
- Design Philosophies (ASD, LRFD, etc.)
- Introduction to the unified manual and to LRFD

II. Compression Members

Reading:  
Geschwindner: Ch. 5  
AISC: COL. \rightarrow 4-1 to 4-322, SPEC. \rightarrow 16.1-10 to 16.1-18 (Ch. B), 16.1-19 to 16.1-25 (Ch. C), 16.1-32 to 16.1-43 (Ch. E), Appendix 6 \rightarrow 16.1-191 to 16.1-195, Commentary \rightarrow 16.1-238 to 16.1-248 (Ch. C, 2b), 16.1-256 to 16.1-267 (Ch. E)

- General Behavior - Euler buckling, elastic/inelastic buckling, BC's and effective length, local buckling
- Design Procedures (AISC)
- "Leaning" and "Built-Up" Columns
Tentative Outline (cont.):

III.  Bending Members

Reading: Geschwindner: Ch. 6, Section 7.4.2
AISC: BEAM → 3-1 to 3-226, SPEC. → 16.1-10 to 16.1-18 (Ch. B),

- Laterally Braced Beam Behavior - stress-strain, formation of plastic hinges, effect of residual stresses
- Laterally Braced Beam Design Procedures (AISC) - flange and web local buckling, web crippling, compact sections
- Laterally Unbraced Beam Behavior - elastic/inelastic lateral-torsional buckling
- Laterally Unbraced Beam Design Procedures (AISC)
- Shear Behavior - shear buckling
- Shear Design Procedures (AISC)

IV.  Composite Beams

Reading: Geschwindner: Ch. 9
AISC: BEAM → 3-6 to 3-7, 3-29 to 3-32, 3-156 to 3-207, SPEC. → 16.1-77 to 16.1-89 (Ch. I), Commentary → 16.1-301 to 16.1-323 (Ch. I)

- Composite Beams - introduction and behavior
- Composite Beam Design Procedures (AISC)

V.  Beam-Columns

Reading: Geschwindner: Ch. 8

- Behavior - interaction of axial and bending loads
- Design Procedures (AISC)
VI. Tension Members

Reading: Geschwindner: Ch. 4
AISC: TEN. → 5-1 to 5-50, SPEC. → 16.1-10 to 16.1-18 (Ch. B), 16.1-26 to 16.1-31 (Ch. D), Commentary → 16.1-249 to 16.1-255 (Ch. D)

- Failure Modes - gross area, net area, block shear
- Design Procedures (AISC)
- "Other" Tension Members - threaded rods, built-up members, etc.

VII. Connections

Reading: Geschwindner: Ch. 10
AISC: BOLTS → 7-1 to 7-20, WELDS → 8-1 to 8-32, CONN. → 9-1 to 9-20, Specification → 16.1-90 to 16.1-113 (Ch. J), Commentary → 16.1-324 to 16.1-352 (Ch. J)

- Bolted Connections - types, failure modes, governing specifications, design
- Welded Connections- types, failure modes, governing specifications, design
Academic Integrity:
From the PSU web site (http://www.psu.edu/ufs/policies/):

49-20 Academic Integrity
Definition and expectations: Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University’s Code of Conduct states that all students should act with personal integrity, respect other students’ dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

To protect the rights and maintain the trust of honest students and support appropriate behavior, faculty and administrators should regularly communicate high standards of integrity and reinforce them by taking reasonable steps to anticipate and deter acts of dishonesty in all assignments (Senate Policy 44-40: Proctoring of Examinations). At the beginning of each course, it is the responsibility of the instructor to provide students with a statement clarifying the application of University and College academic integrity policies to that course.

Attendance (in class):
In class attendance will be spot checked throughout the semester. Attendance at all lectures is expected and should you be absent when your name is called your final homework grade could be affected.

Attendance (out of class):
Multiple out of class activities are planned, some during the class hour and some not. If the activity is planned for class time the attendance policy discussed above holds. All attempts will be made to schedule additional activities around the majority of your class schedules and attendance at those activities is highly encouraged.

Exams:
Two mid-terms and one final examination are scheduled as shown on the 1st sheet. All exams will be open book and open note. The final will be cumulative. NO make-up exams will be given except as required by University policy. Contact me at least 24 hrs. prior to any anticipated absence. You have 24 hrs. after receiving a graded exam to question the grade that was given. All questions and concerns must be submitted in writing.
Homework:

All homework should be completed in a neat and orderly fashion on engineering paper and in pencil. Homework is typically assigned weekly. Problems are to be submitted at the beginning of class typically are due one week after their assignment. NO LATE HOMEWORK WILL BE ACCEPTED. Solutions to the assigned homework problems will be available on the ANGEL site after they are returned. Once graded homework is returned, you have 24 hrs. after receiving it to question the grades that were given. All questions and concerns must be submitted in writing.

Notebook:

At the conclusion of the semester, each student will submit a well organized notebook summarizing course notes, handouts, design problems, quizzes, reference materials and any other pertinent information. The notebook will be due when the final exam is handed in and will be returned outside Dr. Linzell's office after grades are posted.