

SCOPE:	This course covers advanced structural design topics that build on the concepts gained in <i>Structural Analysis, Design of Steel Buildings, Design of Concrete Buildings, and Structural Design of Foundations</i> . This is a capstone design course, therefore, a major focus of the course is devoted to open-ended design projects that will draw from other courses in the civil engineering curriculum. This is also a writing intensive course where submitted written project reports will be reviewed for technical content as well as organization, grammar, punctuation, spelling, syntax, and style.												
REQUIRED: TEXTS:	<p>ASCE/SEI 7-10, <i>Minimum Design Loads for Buildings and Other Structures</i>, American Society of Civil Engineers, New York, 2010.</p> <p>American Institute of Steel Construction, <i>Manual of Steel Construction - LRFD</i>, 13th Edition, 2005.</p> <p>Fisher, <i>Industrial Buildings -Roofs to Column Anchorage</i>, AISC Design Guide Series 7, 2nd Edition. http://www.aisc.org/store/p-1548-design-guide-7-industrial-buildings-roofs-to-anchor-rods.aspx</p> <p>American Concrete Institute – ACI 318-08/318R-08: <i>Building Code Requirements for Structural Concrete and Commentary</i>, 2008.</p> <p>Geshwindner, <i>Unified Design of Steel Structures</i>, John Wiley & Sons, 2008.</p> <p>MacGregor and Wight, <i>Reinforced Concrete - Mechanics and Design</i>, 2008.</p> <p>PCI <i>Design Handbook, Prestressed and Precast Concrete</i>, 6th Edition, 2008. http://www.pci.org/education/resources/index.cfm (password required)</p> <p>PCI, <i>Parking Structures: Recommended Practice for Design and Construction, 1997</i>. http://www.pci.org/view_file.cfm?file=P_MNL-129-98.pdf</p>												
INSTRUCTOR:	Jeffrey A. Laman, PhD, PE Office Hours: Tuesday 9:30 to 11:00, Thursday 9:30 to 11:00.												
LECTURES:	Tuesday and Thursday from 8:00am to 9:15am, 167 Willard												
ATTENDANCE:	Lecture attendance is a critical aspect of learning. See attendance policy for details.												
QUIZZES	Periodic in-class quizzes will be administered. Topics and dates TBD.												
DESIGN PROJECT	Two group, semester design projects are assigned. Descriptions are included in the course pack. Project schedules are as shown in the attached course calendar.												
ENGINEER'S NOTEBOOK	At the conclusion of the semester, each student will submit a well organized notebook summarizing the course notes, handouts, design problems, quizzes, reference materials, and other pertinent information. See <i>Engineer's Notebook Guidelines</i> .												
GRADING:	The course grade will be based on:												
	<table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">Attendance</td> <td style="text-align: right;">5%</td> </tr> <tr> <td style="padding-left: 20px;">Engineer's Notebook/Writing</td> <td style="text-align: right;">10%</td> </tr> <tr> <td style="padding-left: 20px;">Quizzes</td> <td style="text-align: right;">25%</td> </tr> <tr> <td style="padding-left: 20px;">Design Project 1</td> <td style="text-align: right;">40%</td> </tr> <tr> <td style="padding-left: 20px;">Design Project 2</td> <td style="text-align: right;">20%</td> </tr> <tr> <td></td> <td style="text-align: right; border-top: 1px solid black;">100%</td> </tr> </table>	Attendance	5%	Engineer's Notebook/Writing	10%	Quizzes	25%	Design Project 1	40%	Design Project 2	20%		100%
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CE 448W - ADVANCED STRUCTURAL DESIGN - Spring 2010

Lecture	Topic	Reading
1	Course Administration Course Organization General Course Requirements Project 1 Requirements	Course Notes
2-3	Industrial Building Design Industrial Buildings with Cranes Loading Conditions and Combinations. General Building Systems: Roof Systems Framing Systems Bracing Systems	AISC: Design Guide 7 - all AISC LRFD: <i>Code of Standard Practice</i> , pg. 16.3-i Part 2 – <i>General Design Considerations</i> , pg. 2-1 to 2-48
4-9	Wind, Snow, Ponding Loading ASCE 7 Wind Load Criteria ASCE 7 Snow Load Criteria AISC/ASCE 7 Ponding Load Criteria	ASCE 7: Ch 1 thru 4, pg 1-14 Ch 6 thru 8, pg 23-84 ASCE 7 Commentary , Ch 1-4, 6-8 AISC LRFD: App 2, Ponding
10-14	Combination Crane Girder Design Influence Lines and V and M Envelopes Cranes, Crane Loading Combination Section Crane Girder Design	Course Notes AISC LRFD: Ch F
15-16	Stepped Column Design for Industrial Buildings Load Combinations Indeterminate Analysis of Variable Stiffness Beam-Column Upper and Lower Segment Design	AISC: Design Guide 7 Course Notes
17-18	Connections Structural Fasteners - review Welding - review Connections Eccentric Loading to bolts groups Eccentric Loads Applied to welds Framed Beam Connections Continuous Beam to Column Connections Continuous Beam to Beam Connections	Geschwindner: Ch 11 and 12 AISC LRFD: Ch J <i>Spec for Struc Jts Using A325 or A490</i>
19	Parking Structure Geometry	PCI Parking Structures Recommended Practice
20-26	Prestressed Precast Concrete Basic Concepts of Prestressing Calculation of Stresses in Prestressed Beams Partial Loss of Prestress Flexural Design of Prestressed Beams Flexural Strength Design for Shear	PCI Design Handbook MacGregor and Wight: Ch ??
27-28	Concrete Shear Wall Design	ACI 318 Class Notes
29-30	Ethics Discussion	Class Notes

ATTENDANCE POLICY

Regular and full attendance is critical to student success in this course. All absences are treated the same, regardless of reason unless there is a severe and compelling issue. Exceptional cases must be discussed in advance, in person with the instructor. Two arrivals to lecture after 8:15am will be recorded as one absence. Chronic tardiness will be evaluated on a case-by-case basis.

- a. 0 to 2 absences = 5% earned
- b. 3 absences = 4% earned
- c. 4 absences = 3% earned
- d. 5 absences = 2% earned
- e. 6 absences = 1% earned
- f. 7 absences = 0% earned

Absences will be recorded on the angel website and should be monitored by each student. It is the student's responsibility to confirm the accuracy of the attendance record. Students absent 8 or more class periods will automatically receive an incomplete for the semester.

QUIZZES

Several short, in-class quizzes will be administered during the semester. Quizzes will evaluate student understanding of recent and previous lectures, class discussions, and reading. All quizzes will be open book, open notes with response provided on standard engineering paper in pencil only. Students who attend all class sessions, take careful notes, complete reading in a timely fashion, and proceed diligently and methodically on semester design projects will successfully answer quiz questions. No make-up quizzes will be provided.

COURSE GRADING POLICY

Quizzes will vary in difficulty, therefore, it may be necessary to adjust raw scores to account for this variability. Also, grades assigned for projects may be adjusted at the discretion of the instructor. Grades assigned for attendance and Engineer's Notebook/Writing will not be adjusted. The adjusted mean will be the center of the standard university grading scale range for a "B-" (81.50%). Exception to this adjustment: if the raw mean score is greater than 81.50%, students keep their raw scores – scores will never be adjusted downward. The standard university grading scale is as follows:

93.00 to 100	A	
90.00 to 92.99	A-	
87.00 to 89.99	B+	
83.00 to 86.99	B	
80.00 to 82.99	B-	(adjusted course average = 81.50%)
77.00 to 79.99	C+	
70.00 to 76.99	C	
60.00 to 69.99	D	
0.00 to 59.99	F	

Petitions for instructor review of graded assignments must be made within 48 hours of return of the submittal. After 48 hours, the grade stands.

ENGINEER'S NOTEBOOK GUIDELINES

1. All materials in a large (2" or greater), 3-ringed binder – no loose materials.
2. A cover page on the outside of the binder containing course number, course title, semester, student name, instructor, Penn State University
3. Course number, course title, and student name on the spine
4. Overall table of contents, identifying each section by lecture topic and any appendices
5. Table of contents for each tabbed section:
 - Table of Contents
 - Course Administration/Outline
 - Industrial Building Design
 - Wind, Snow, Ponding Loading
 - Crane Girder Design
 - Stepped Column Design
 - Connections
 - Prestressed Precast Concrete Design
 - Concrete Shear Wall Design
 - Ethics
 - **Quizzes (must be in separate, tabbed section and corrected – see #9 below).**
6. All pages numbered sequentially (except quizzes).
7. All submitted work must be laser printed or hand written in pencil on engineering paper only. Never take any notes on anything other than engineering paper.
8. All notebook sections tabbed and labeled with professional, commercially available tabs.
9. All quizzes containing errors marked by the grader must be corrected with RED colored pencil or RED colored pen. Major corrections should be completed on a new sheet of engineering paper with "**HW# xx CORRECTIONS**" as heading and completed with a normal pencil.
10. Electronic course files (reference material from ANGEL, excel programs, project write-ups, project CAD drawings, all other electronic files related to the course) must be on CD or flash drive and included with the notebook.
11. The CD/flash drive must be enclosed in a plastic, 3-ring binder sleeve (not loose, not in binder pocket, not looped around a ring)
12. **Engineer's Notebooks are to be submitted in 231J Sackett before 12:00 am, Monday, April 25, 2011. Late submissions will not be accepted under any circumstances.**
13. Engineer's Notebooks may be retrieved from 231J Sackett between 3:00 pm and 5:00pm Tuesday, April 26.
14. Notebooks not retrieved by 4:00 pm Friday, April 29 can be collected at a later, prearranged date.