

The Pennsylvania State University
CE 448W – Advanced Structural Design
Spring Semester 2007
M W F 09:05A - 09:55A
127 Sackett (and 207 Sackett)

Instructors: Andrea Schokker (ashock@engr.psu.edu)
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Teaching Assistant: Rich Myers (rem221@psu.edu)
321 Sackett

Office Hours: MW 2-3 p.m. (Schokker)
MW 10-12 p.m. (Volz)
MW 1-3 p.m. (Myers)

Prerequisites: CE341, CE342, CE435 (concurrent)

CEE Program Outcomes Mapped to this course:

- (4) An ability to design a system, component, or process to meet desired needs
- (8) An ability to function on multi-disciplinary teams
- (10) An ability to communicate effectively
- (11) An understanding of professional and ethical responsibility
- (12) The broad education necessary to understand the impact of engineering solutions in a global and societal context
- (13) A knowledge of contemporary issues
- (14) A recognition of the need for, and an ability to engage in life-long learning

Course Objectives:

- Expand knowledge and understanding of structural design within the framework of a realistic major design project
- Advance proficiency with use of design codes and standards
- Develop an appreciation for the role of professional and ethical responsibility in engineering practice
- Develop an appreciation for the impact of structural projects in a global and societal context

Required Texts: ACI – 318-05/318R-05: Building Code Requirements for Structural Concrete and Commentary, 2005.

AISC Manual of Steel Construction, Load and Resistance Factor Design (LRFD), 13th Edition.

ASCE 7-05, Minimum Design Loads for Buildings and Other Structures,
American Society of Civil Engineers.

PCI Design Handbook, Prestressed and Precast Concrete, 5th Edition,
Prestressed Concrete Institute (provided at no cost by the instructor)

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The course is focused around building on your existing knowledge of structural engineering design, culminating in a final project report and a set of design drawings. Select topics will be chosen for detailed lectures as given below, combined with in-class group work on the final design project. At multiple stages in the project development, submittals will be required as a progress check. These will be graded and corrections should be made before incorporating the material into your final project.

Course Content:	Course Overview (Schokker/Volz)	1 hrs
	Project Overview (Schokker/Volz)	1 hrs
	Framing Systems (Volz)	2 hrs
	Loading (Volz)	2 hrs
	Foundations (Volz)	2 hr
	Shear Walls (Volz)	2 hrs
	Prestressed Concrete (Schokker)	6 hrs
	Corbels (Volz)	2 hrs
	Slender Columns (Schokker)	3 hrs
	Steel Connections (Volz)	4 hrs
	Two-way Slabs (Schokker)	2 hr
	Overview of Seismic Considerations (Schokker)	1 hr
	<u>Ethics and Professionalism (Schokker)</u>	<u>2 hrs</u>
	Total Lectures	30 hrs
In-class group work, discussion, & site visits	15 hrs	

Grading:	Homework/Project Submittals	70%
	Final Report	<u>30%</u>
		100%

Key Items: Class attendance is critical to the successful completion of this course.
No late project submissions will be accepted.
All drawings must be completed in AutoCAD.

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Tentative Outline:

- I. Framing Systems
 - Floor systems
 - Lateral systems
 - Specific issues for office buildings
 - Specific issues for parking garages

- II. Loading
 - ASCE 7 dead and live load criteria
 - ASCE 7 wind load criteria
 - ASCE 7 snow load criteria
 - Influence lines and shear and moment envelopes

- III. Foundation Design
 - Square and rectangular spread footings
 - Retaining walls

- IV. Shear Wall Design

- V. Prestressed Concrete Design
 - Basic Concepts of Prestressing
 - Partial Loss of Prestress
 - Calculation of Stresses in Prestressed Beams
 - Flexural Strength
 - Flexural Design of Prestressed Beams
 - Design for Shear

- VI. Corbel Design

- VII. Slender Column Design

- VIII. Connection Design
 - Shear Connections
 - Bracing Connections

- IX. Two-way Slab Design
 - Overview
 - Direct Design Method
 - Equivalent Frame Method

- X. Overview of Seismic Design Considerations

- XI. Ethics and Professionalism

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Academic Honesty:

From the Faculty Senate 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 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.