

**CIVE 567 – Advanced Concrete Design**  
Spring 2015  
MWF 10:00am-11:00am      Engineering E205

**Instructor:**

Dr. Rebecca Atadero

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Office Hours: MWF 1-2:30 pm

I will do my best to always be available at these times. Also, if my door is open at other times feel free to stop by. If you have trouble reaching me please schedule an appointment via email.

Course Website: Canvas

**Course Objectives:**

A student successfully completing this course will be able to:

1. Design a prestressed concrete beam to carry flexure and shear forces
2. Recognize situations where concrete members will be subject to significant torsion and design reinforcement for these cases
3. Analyze and design two-way slab systems
4. Analyze and design long columns constructed from reinforced concrete
5. Analyze and design corbels, brackets and deep beams

**Topics:**

1. Prestressed concrete (primarily beams)
2. Torsion design for reinforced and prestressed concrete members
3. Two-way slab systems (reinforced concrete)
4. Long columns (reinforced concrete)
5. Advanced topics in shear, for example corbels and brackets, deep beams
6. Anchorage to concrete, connections
7. Intro to strut-and-tie models

**Required Resources:**

*ACI 318-14 Building Code Requirements for Structural Concrete and Commentary.* American Concrete Institute, Farmington Hills, MI: 2014.

In order to get the student discounted price of \$99 you will need to become a student member of ACI and order your code. Detailed ordering directions are posted on Canvas. Code orders should be placed by January 23, 2015 in order to receive your code in time to keep up with the class.

*PCI Design Handbook, 7<sup>th</sup> Edition.* Precast/Prestressed Concrete Institute, Chicago, IL: 2010.

You can purchase this handbook at a reduced student price by becoming a student member of PCI. The hardcopy version is available for \$99 to students and there is also a CD version for \$20.

**Other Resources:**

Although not required, if you are very interested in concrete design or if you find that you learn best from textbooks, you should consider purchasing a traditional textbook(s) to help you learn the course material. The material covered in this course is typically presented in two different textbooks, one on prestressed concrete and one on reinforced concrete. There are not a whole lot of options for prestressed concrete, and I am not currently aware of a prestressed textbook that has been updated to the new version of ACI 318. The book below has been recommended in the past -it is not perfect but does have many examples.

Nawy, E.G. *Prestressed Concrete, A Fundamental Approach*, 5<sup>th</sup> ed. Update. Prentice Hall, Upper Saddle River , NJ: 2010.

There are many different textbooks for reinforced concrete design. I have heard that there is a book updated for the new code, but I have not been able to find the book on the web for purchase. If I get better information I will let you know. For now you might want to consider a low cost older edition or the library. Most of the theory is probably fine – but you will have to find the proper code sections in the new code.

**Prerequisites:** CIVE 467 (Undergraduate Reinforced Concrete Design)

### **Assignments and Grading:**

#### Homework (22%)

Homework problems will be assigned as needed, roughly once a week. These assignments should be completed individually, although I encourage you to consult with other students and me when necessary. Make sure you give every problem a reasonable amount of effort before seeking help. Remember that working through the problems is one of the best ways to learn the material and prepare for tests, and that homework is assigned to help you learn – not because grading your assignments is fun.

**Assignments will be due in class on the assigned due date.** Submissions turned in within 24 hours of the due date will be reduced 25%. Assignments more than 24 hours late will not be accepted.

Organization, neatness, and completeness (in terms of solution process) will count for 10% of the grade on each homework assignment. Engineers must be able to communicate their work to each other. Hand calculations are part of the design documentation process.

#### Class Project (10%)

We will have one long-term group project in this course. I am planning to base this project on the PCI Big Beam Contest:

[http://www.pci.org/uploadedFiles/Siteroot/Education/ Related Content/Related Content Files/Big-Beam-Rules-2015.pdf](http://www.pci.org/uploadedFiles/Siteroot/Education/Related_Content/Related_Content_Files/Big-Beam-Rules-2015.pdf)

We will discuss this idea more in class.

#### Class Participation/Behavior (3%)

I also expect students to be respectful to me and their classmates. One percentage point will be subtracted for each occurrence of disrespectful behavior such as (but not limited to) students holding private conversations while I am talking or disruptive entrances and exits from the classroom. Students who continue to display disruptive behavior after they have lost all 3% will be referred to the Office of Conflict Resolution and Student Conduct Services. I also expect students to stay on task during class periods where students are given time to work on examples in class.

#### Exams (65%)

There will be two midterms (20% each) in this class and a final (25%). All tests will be cumulative with an emphasis on more recent material. **Students must use a FE approved calculator on exams.** Students will be allowed to use their copy of ACI 318 and a single page (front and back) formula sheet during tests. Students can write in manuals as they see fit, and they can use SMALL tabs to mark significant pages, but larger tabs/post-its with notes are NOT ALLOWED.

Midterms will be announced in class at least one week prior to the test date. I am tentatively planning to have them in class on Wednesday March 4<sup>th</sup>, and Wednesday April 22<sup>nd</sup>. The final exam will be given on Thursday, May 14<sup>th</sup> from 7:30-9:30am as scheduled by the university. Make-up exams will be given only in extraordinary, documented circumstances.

### Final Grades

Term grades for this course will be assigned using +/- grading. Remember these grades are a reflection of your work throughout the semester. You need to start worrying about your final grade NOW. By the time we get to May it is too late to make big changes.

### **Academic Integrity:**

This course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog (<http://catalog.colostate.edu/Content/files/2014/FrontPDF/1.6POLICIES.pdf>) and the Student Conduct Code (<http://www.conflictresolution.colostate.edu/conduct-code>).

As stated by the Catalog ***“Academic integrity is conceptualized as doing and taking credit for one's own work.”*** Promoting academic integrity is particularly important to me as your professor because I want to be fair to all students, because I believe that all students in this class are capable of success on their own, and because you are training to be civil engineers – a profession that has deep responsibility for public safety.

In this class all assignments should be completed by individuals. Below I have described in general terms how academic integrity applies to each graded component. This description is not all inclusive; please contact me if you have questions about behaviors not specifically described here.

Exams will include the following honor pledge for you to sign:

***I have not given, received or used any unauthorized assistance on this exam.***

Homework Assignments – Students are encouraged to consult with and learn from each other, but the final submitted assignment must reflect the individual effort and understanding of the student submitting the assignment. Direct copying is not acceptable and in this case all students with the same work will be given a zero.

Group Project – Students are expected to contribute to their team and take on a fair portion of work.

Exams – The midterm and final exams should be completed individually without aid from other students. Students are allowed to use only their own copy of ACI 318 and a one page formula sheet. Exams must be taken with FE approved calculators.

Class Participation/Behavior – When I ask for group work during class sessions it is important that each student participates in the assignment, so as not to compromise the learning opportunity of other students.

### **Special Needs:**

If you have any special needs please come visit me during office hours so that we can discuss how I can help you be successful in this course.