

CE 8040 Prestressed Concrete Design

115 Lowry Hall

Fall 2016

Tuesday and Thursday 8:00 am – 9:15 am

Instructor



Dr. Ross
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Office Hours

TBD

Teaching Assistant

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Office Hours

TBD

Critical Thinking

This course will be taught as a Clemson Thinks 2 (CT2) critical thinking seminar. CT2, Clemson's Quality Enhancement Plan, is an ambitious experiment in critical thinking that seeks to transform learning and teaching at Clemson University.

Critical Thinking is a reasoned and reflective judgement applied in solving structural engineering problems and in making design decisions (paraphrase of Facione, Critical Thinking What It Is and Why It Counts). Critical Thinking is essential for structural engineers and, apparently, something new structural engineers are lacking. Consider the following comment made at a recent structural engineering convention:

New engineers just don't know how to think anymore. They run straight to a computer and blindly accept the output. Schools need to teach engineers how to think, not just to perform calculations and use software. (Unidentified commenter, American Concrete Institute 2013 Spring Convention, Minneapolis, MN)

While the commenter's observations cannot be generalized to all new structural engineers, the sentiment was shared by many of the other attendees at the referenced convention. Employers are concerned and this is alarming. As such, the Critical Thinking features of CE 8040 are designed to give you an edge as you seek employment and begin your structural engineering career. You might consider adding the Critical Thinking features of this course to your resume or using it as a talking point during job interviews.

Some of your assignments in this course will be collected as artifacts (evidence) of student Critical Thinking. A sample of these artifacts will be submitted as documentation for CT2. Additionally, your growth in Critical Thinking skills will be assessed using the California Critical Thinking Skills Test (CCTST). Participation, but not performance, in the CCTST pre- and post-tests will be considered as a part of your course grade.



Course Objectives

Develop a working knowledge of essential concepts in prestressed concrete design, including: materials, methods, and mechanics. Develop the ability to calculate stresses, deflections, shear capacity, and flexural capacity of basic prestressed members. Develop the ability to design basic prestressed members.

Although all course objectives relate to Critical Thinking, the following specific objectives will be assessed as part of the CT2 seminar:

- Evaluate the evidence, limitations, and foundational principals associated with the assumptions and conditions of flexural theory of reinforced concrete members.
- Identify appropriate design criteria for a different types and functions of prestressed concrete structures.
- Judge the quality of a prestressed concrete design subject to different design criteria.

Prerequisite

CE 4020 or equivalent undergraduate reinforced concrete design course

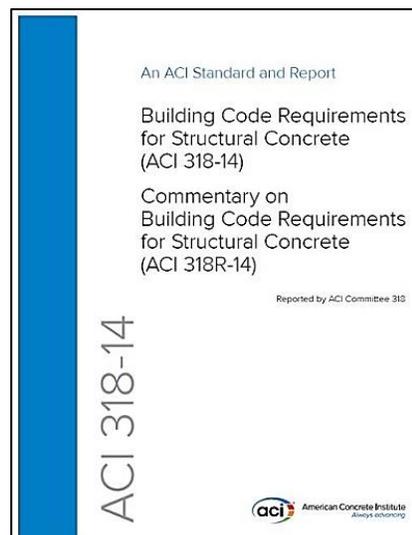
Required Course Texts

PCI Design Handbook 7th Edition, Precast/Prestressed Concrete Institute, Chicago, IL, 2010. Student CD edition \$20 w/ PCI student membership. Membership application: https://www.pci.org/uploadedFiles/Siteroot/About_PCI/Join/Student%20Application%20MEM16-3262.pdf

ACI 318-14 Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute, Farmington Hills, MI. 2014. Student edition \$99 w/ ACI student membership. Membership application: <https://www.concrete.org/membership/becomeamember.aspx?preselect=fs>

AASHTO LRFD Bridge Design Specifications 6th Edition, American Association of State Highway Transportation Officials, Washington, DC. 2013. (Instructions for obtaining relevant sections will be provided by the instructor)

CE 804 course notes, distributed to students on Blackboard.



Recommended Course Texts

Post-Tensioning Manual 6th Edition, Post-Tensioning Institute (PTI), Farmington Hills, MI. (Student CD edition \$20)

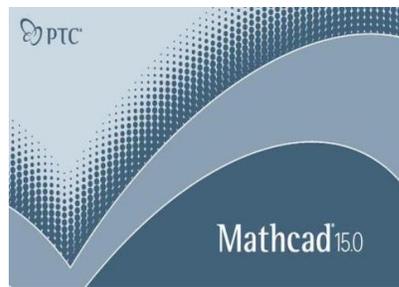
Any textbook from an undergraduate reinforced concrete course.

Computer and Software Requirements

Blackboard will be used by the instructor to post notes, announcements, assignments, solutions, and grades. Students are responsible for regularly checking Blackboard for course information.

MathCAD will be used by the instructor to illustrate calculations. MathCAD is strongly recommended for use in homework assignments and is available through CCIT:

http://www.clemson.edu/ccit/software_applications/software/licenses/mathcad.html



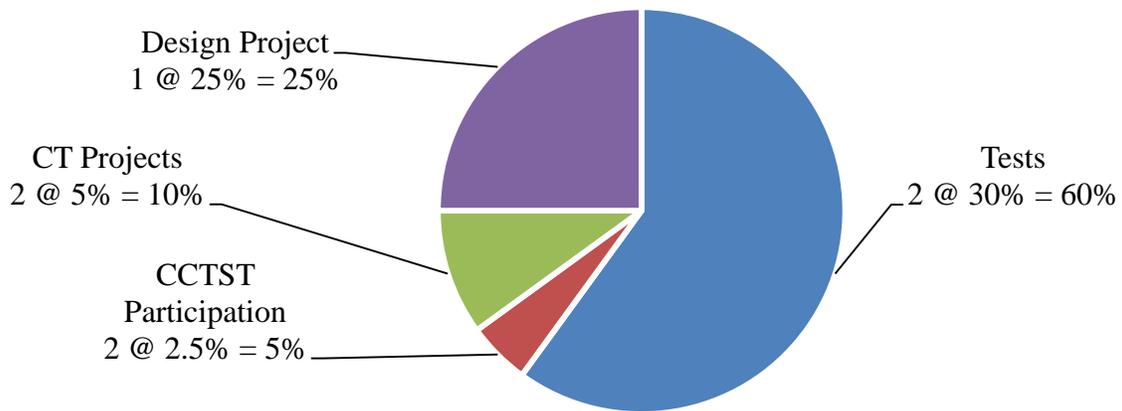
Important Dates

Thursday, August 18	First day of class
Tuesday, August 23	Add deadline
Tuesday, August 30	Last day to drop without "W"
Thursday, September 29	Test 1
Friday, October 7	Mid-term grade due
Friday, October 21	Drop deadline
Tuesday, October 25	No class, ACI Convention
Thursday, November 3	Test 2
Tuesday, November 8	No class, fall break
Thursday, November 24	No class, Thanksgiving
Thursday, December 1	Last day of class
Friday, December 9, 7:30-9pm	Test 3 – Final exam

Attendance and Instructor No-Show

Attendance at lectures will not be formally monitored. Attendance and participation in lectures, however, is essential for learning and is expected of all students. Students are responsible for material covered in lectures, regardless of attendance. Visits to the instructor during office hours and email responses to student inquiries are privileges for students who regularly attend lecture. Students and instructor are expected to be punctual. If the instructor does not arrive by 8:15am, students may assume that class is canceled.

Grading



Homework will be assigned throughout the semester but it will not be graded. It is highly recommended that students complete the assignments as the homework content will be highly correlated with test content.

Grade Scale

Final Score	Letter Grade
>90%	A
89.9% - 80%	B
79.9% - 70%	C
69.9% - 60%	D
59.9% >	F

Conflict and Resolution for Quizzes and Homework

Students who have questions or concerns with grading may bring them to the attention of the instructor in writing within 7 days of the graded item in question being returned to the student. The written description of the question or concern must be clear and concise, and must provide justification for any requested action. No actions will be taken by the instruction 7 days after the graded item has been returned. *“Fishing” for a higher grade is not acceptable.*



Working with other students

Much (most?) of your learning in graduate school will come from interactions with your fellow students. As such, students are encouraged to discuss lectures, homework, and projects with each other. However, all writing, programming, analysis, and project reports are to be created alone. Each student must submit their own project reports and artifacts. A good rule of thumb is that you should understand what you are turning in and be able to defend it in front of the class. Collaboration is not allowed during tests.

Academic Integrity

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, lying, cheating, or stealing in any form will not be permitted.



Actors portraying Anna Marie Calhoun Clemson and Thomas Clemson.
(Photo credit Clemson Newsstand)

Students with Disabilities

Students with disabilities requesting accommodations should make an appointment with Dr. Margaret Camp (656-6848), Director of Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Title IX

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at

<http://www.clemson.edu/campuslife/campus-services/access/title-ix/>

Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Test Policy

Two tests will be given during normal class time and one will be given during the scheduled final exam. Make-up tests will only be given in the case of unavoidable emergencies. Emergencies include medical care, military service, jury duty, and certain other excuses, as defined by the instructor. Emergencies do not include job interviews, nonrefundable airplane tickets purchased, SCUBA diving trips, your cousins wedding, a marathon, etc. When practical, discuss your problem with the instructor before missing the test.

A seating chart will be provided for each test.

Textbooks, notes, equation sheets, etc. will not be allowed during tests. Any equations or other information needed for the quizzes will be provided by the instructor.

The final exam will only be given during the schedule time. Special accommodations for the final exam will only be made in the case of unavoidable emergencies.

Correspondence with Instructor

E-mail is the preferred method for contacting the instructor. The instructor will work to provide a timely response to messages; however, due to travel and other circumstances, responses may take a few days. The instructor will not generally reply to messages on weekends. The instructor will not address questions in the 24 hours prior to tests.

Topics

This is a tentative list of topics covered in the course. It will be adjusted as needed based on progress of the class.

- Introduction of prestressed concrete – 1 class
- CCTST – ½ class x 2
- Reinforced concrete review – 1 class
- Presentations of Critical Thinking Project #1 – 1 class
- Materials – 1 class
- Transfer and development – 1 class
- Prestress losses – 2 classes
- Stress calculations – 2 classes
- Flexural capacity – 2 classes
- Shear capacity – 2 classes
- Prestressed concrete applications and history – 1 class
- Tour of precast concrete fabrication facility – 1 class
- Tour of precast/prestressed concrete structure – 1 class
- Guest lecture from Precast/Prestressed Concrete Institute – 1 class
- Composite beams – 2 classes
- Deflections – 1 class
- Continuous members and secondary moments – 2 classes
- Connections and anchorage – 1 class
- Presentations of Design Projects – 2 classes

By the end of the semester you'll be designing members and creating drawings like this:

