

**CE 481/581: Reinforced Concrete Design**

**Oregon State University**

**Fall Quarter 2007**

<http://classes.engr.oregonstate.edu/cce/fall2007/ce481>

Also see blackboard

Monday/Wednesday/Friday 10:00 to 11:10 AM in Owen 102

**Instructor:** Dr. Christopher Higgins  
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Office Hours: 11:20 AM to 12:00 PM Monday and Wednesday  
or by appointment

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Office Hours: W&F 9:00 AM to 10:00 AM  
or by appointment

**Prerequisites:** CE 381 Structural Analysis

**Text:** MacGregor, J.G. and Wight, J.K. (2005). Reinforced Concrete Mechanics and Design, 4<sup>th</sup> Ed., Pearson Prentice Hall, Upper Saddle River, NJ.

**Code:** ACI 318-05, (2005). *Building Code and Commentary*, American Concrete Institute, Detroit, MI.

**Topics:**

Introduction to Concrete (MacGregor Chapter 1)

Introduction to Load and Resistance Design for Concrete (MacGregor Chapter 2)

Background Codes and Specifications: ACI 318 (MacGregor Chapter 2)

Mechanical Properties of Concrete and Reinforcing Steel (MacGregor Chapter 3)

Analysis and Design of Flexural Members (MacGregor Chapter 4 and 5)

Tension reinforcement

Tension and compression reinforcement

Analysis and Design for Shear in Beams (MacGregor Chapter 6)

Development, Anchorage, and Splicing of Reinforcement (MacGregor Chapter 8)

**Grading:**

Homework: 20%

Midterm Exam: 35%

Final Exam: 35%

Class Part./Quiz: 10%

**Policies:**

- 1) Homework is due the following week after assignment. The instructor will note any exceptions to this deadline in class.
- 2) Late homework will not be accepted without valid excuse.
- 3) Graduate students will be required to prepare a review of a recent journal article regarding a reinforced concrete topic of their choice as approved by the instructor.
- 4) Graduate students will also be required to solve additional problems on exams.
- 5) All work will be done in a neat, well-organized, professional manner as follows:
  - a) Pencil and engineering paper will be used.
  - b) All work will be printed or legibly written.
  - c) Only one side of the paper will be used.
  - d) Problem sets will be stapled at upper left corner.
  - e) Course number, date, student's name and page number will be shown at the top of each sheet.
  - f) Problem number and a problem statement will appear before each problem. The problem statement should include the essence of what is given, what you are to find and a figure when appropriate.
  - g) The problem solution must be presented in a logical, orderly fashion, including fundamental equations used and sufficient (but brief) written text to explain your procedure.
  - h) Answers will be underlined or boxed. The answer must include the correct units and show an appropriate number of significant figures.

**Note: Homework submitted in an unprofessional manner (sloppy, disorganized, difficult to read/follow) will be returned to the student at the next class session. It may be resubmitted for a maximum of 80% credit 1 week after the original due date. If not resubmitted at that time, a grade of 0% will be given.**

**Academic Integrity:**

Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas: cheating- use or attempted use of unauthorized materials, information or study aids; fabrication- falsification or invention of any information; assisting- helping another commit an act of academic dishonesty; tampering- altering or interfering with evaluation instruments and documents; plagiarism- representing the words or ideas of another person as one's own. For more information about academic integrity and the University's policies and procedures in this area, you are welcome to visit the Student Conduct web site at: <http://www.orst.edu/admin/stucon/achon.htm>

**Disruptive Behavior:**

Students are expected to maintain an appropriate learning environment in the classroom. Students have a responsibility to treat each other with dignity and respect. Examples of disruptive behaviors include: being late, reading the paper, sleeping during class, making noises, repeatedly interrupting, passing notes, answering cell phone, harassing behavior, and inappropriate language. Disruptive behavior will not be tolerated and will impact the class participation portion of the final grade. The golden rule applies here.

**Disabled Student Assistance:**

Services are available for students with documented disabilities to provide assistance in the class. For more information about the services, contact SSD, Room A200, Kerr Administration Building (737-4098 or T.D.D. 737-3666) or e-mail [Disability.services@orst.edu](mailto:Disability.services@orst.edu).

**Learning Objectives:**

After this course, students should be able to:

- 1) Employ classical structural analysis methods for analysis and design of statically determinate reinforced concrete beams.
- 2) Identify typical material parameters for reinforced concrete structural elements including:
  - a. Size and grade of reinforcing steel.
  - b. Concrete mechanical properties (Modulus of elasticity,  $f'_c$ , modulus of rupture).
- 3) Apply strain compatibility analysis for analysis and design of reinforced concrete beams.
- 4) Apply code provisions for concrete beams including strength, (flexure and shear) and detailing of reinforcing (development).
- 5) Design and detail a reinforced concrete beam with tension-only reinforcement for flexure and shear.
- 6) CE581: Demonstrate a more thorough understanding of LO 1-5 through a project or technical paper review.