**Instructor:** Dr. Christopher Higgins, P.E.
Chris.higgins@orst.edu
Office: Owen Hall 348
Phone: 737-8869
Office Hours: 4:00 PM to 5:00 PM Monday and Wednesday
or by appointment

**TA:** None

**Prerequisites:** CE 381 Structural Analysis, CE 481 Reinforced Concrete Design

**References:** No required text. Several good reference texts:
- Design of Concrete Structures, 15th Ed. Darwin, Dolan, and Nilson, McGraw-Hill
- Reinforced Concrete: Mechanics and Design, Wight, and MacGregor, Prentice Hall

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


**Topics:**
- Basics of Structural Reliability for Concrete
- Load and Resistance Design Codes and Specifications for Concrete: ACI, Canadian, and European approaches.
- Moment-curvature analysis: Serviceability, Strength, Ductility
- Analysis and Design of Short Beam-Columns
  - Tied and Spiral Columns
- Analysis and Design of Slender Beam-Columns
  - Moment magnifier method
- Advanced Shear Design and Analysis Methods
  - Variable angle truss models, Compression Field Theory, Modified Compression Field Theory, Strut and Tie Methods
- Shear walls

**Grading:**
- Homework: 30%
- Midterm Exam: 25%
- Final Exam: 25%
- Project: 15%
- Class Part./Quiz: 5%
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) 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:
Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student’s own efforts or the efforts of another. It includes:

• cheating - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.

• fabrication - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.

• assisting - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).

• tampering - altering or interfering with evaluation instruments or documents.

• plagiarism - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it 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://cce.oregonstate.edu/code-student-conduct
http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf
**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.

**Statement Regarding Students with Disabilities:** Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**Student Evaluation of Course:** The online Student Evaluation of Teaching system opens to students the Monday of dead week and closes the Monday following the end of finals. Students will receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to “sign” their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.
Learning Objectives:
After this course, students should be able to:
1) Perform moment curvature analysis to predict section response and compute deflections.
2) Develop axial load-moment interaction diagrams for tied columns.
3) Determine P-Δ and P-δ effects for slender columns in sway and non-sway frames.
4) Apply strut and tie method for shear design of a deep beam.
5) Design a shear wall.