Course Description

Time: MW 9:30-10:45 am, Location: SWGN 2A05

Instructor: Dr. Paul H. Ziehl
Assistant Professor, CEE
Office: C206
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Office Hours: TTh 9:30-11:00 am

Prerequisites: If you do not have a passing grade in all prerequisites, e-mail me immediately with a description of your situation. Prerequisites are enforced.

General Description: Course description from course catalog.

Course Objectives: Develop a better understanding of the behavior of reinforced concrete.

Required Texts: 
- ACI 318-05 – Building Code Requirements for Reinforced Concrete and Commentary, American Concrete Institute, 2005

Complete the reading assignment prior to the class lecture.

Grading: There will be one midterm and a comprehensive final exam. The following are the dates for the midterm and final exam.

- Midterm – approx. midway through the course
- Final Exam – per final exam schedule (time and place)

The midterm and final exam will be open book and open notes.

Breakdown of grades will be:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm</td>
<td>30%</td>
</tr>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project</td>
<td>10%</td>
</tr>
<tr>
<td>Final</td>
<td>50%</td>
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Grades are assigned according to the typical '90 to 100 = A' approach. However, grades can and often are adjusted 'up'. They will not be adjusted 'down'.

Make-up exams will be given only for medical or other emergencies. A note from a doctor will be required for a make-up exam.
If a student has a conflict, religious or otherwise, with the exam schedule inform the instructor at least one week in advance. Suitable accommodations will be made.

Homework is due one week after it is assigned. It is due at the beginning of class. If it is late it will receive an automatic deduction of 50%. Homework more than one day late can be turned in for review but not for credit.

Attendance: Regular attendance is recommended.

SUBJECT MATTER

Introduction

Materials; Concrete and Steel Properties (Ch. 3)

Review of Flexural and Shear Design (Ch. 4 to Ch. 6)

Torsional Design (Ch. 7)

Slender Columns (Ch. 12)

Multistory Building Frames

Two-way Slabs (Ch. 13 to Ch. 15)

Footings (Ch. 16)

Strut-and-Tie

Seismic Design
Course Contents:  (The chapter and section number correspond with those in the MacGregor book.)

Chapter 1:  Introduction

Chapter 2:  The Design Process
  2-1 Objectives of Design
  2-2 Design Process
  2-3 Limit States and the Design of Reinforced Concrete
  2-4 Structural Safety
  2-6 Design Procedures Specified in the ACI Building Code
  2-7 Loadings and Actions
  2-8 Design for Economy

Chapter 3:  Materials
  3-2 Strength of Concrete
  3-3 Mechanical Properties of Concrete
  3-9 Reinforcement

Chapter 4:  Flexure:  Basic Concepts, Rectangular Beams
  4-1 Introduction
  4-2 Flexure Theory
  4-3 Analysis of Reinforced Concrete Beams
  4-4 Design of Rectangular Beams

Chapter 5:  Flexure:  T-Beams, Beams with Compression Reinforcement, and Special Cases
  5-1 Introduction
  5-2 T Beams
  5-3 Beams with Compression Reinforcement

Chapter 6:  Shear in Beams
  6-1 Introduction
  6-2 Basic Theory
  6-3 Behavior of Beams Failing in Shear
  6-5 Analysis and Design of Reinforced Concrete Beams for Shear – ACI Code

Chapter 8:  Development, Anchorage, and Splicing of Reinforcement
  8-1 Introduction
  8-2 Mechanism of Bond Transfer
  8-3 Development Length
  8-4 Hooked Anchorages
  8-5 Design for Anchorages
  8-6 Bar Cutoffs, and Development of Bars in Flexural Members
  8-7 Calculation of Bar Cutoff Points
  8-8 Splices

Chapter 9:  Serviceability
  9-1 Introduction
  9-2 Elastic Analysis of Beam Sections
  9-3 Cracking
  9-4 Deflections:  Response of Concrete Beams
9-5 Consideration of Deflections in Design

Chapter 10: Continuous Beams and One-Way Slabs
10-1 Introduction
10-2 Continuity in Reinforced Concrete Structures
10-3 Moments and Shears in Continuous Beams
10-4 One-Way Slabs

Chapter 11: Columns: Combined Axial Load and Bending
11-1 Introduction
11-2 Tied and Spiral Columns
11-3 Interaction Diagrams
11-4 Interaction Diagrams for Concrete Columns
11-5 Design of Short Columns

Chapter 16: Footings
16-1 Introduction
16-2 Soil Pressure under Footings
16-3 Structural Action of Strip and Spread Footings
16-4 Strip or Wall Footings
16-5 Spread Footings
16-8 Pile Caps