

**Instructor:** B. M. Shahrooz

**Office:** 765c Baldwin Hall

**Phone:** 556-3677

**E-mail:** [Bahram.Shahrooz@uc.edu](mailto:Bahram.Shahrooz@uc.edu)

**Discussion Classes:** Arranged as needed

**Required Texts:**

Class notes on Blackboard

MacGregor J.G., Wight J.K. (2005), "Reinforced Concrete Mechanics and Design," 4<sup>th</sup> Ed.

**References:**

ACI 318-05 Building Code and Commentary

Brief Description: The objective of this course is to develop an understanding of fundamental principles governing behavior of reinforced concrete members. This objective is achieved by examining reinforced concrete materials, the interaction of these materials under simple loadings and in simple configurations, and the behavior of reinforced concrete members as affected by materials and loadings. Discussion of the elements is limited to beams and columns in order to avoid complications that arise with complete structural systems, and so that discussion can focus more clearly on the mechanical characteristics of reinforced concrete. In addition to conventional design practices, this course will address the development and implementation of theoretical and empirical solutions.

Prerequisite: The students who take this course must have had an undergraduate course in reinforced concrete design. The students are assumed to know:

- basic flexural behavior and design of R.C. beams
- calculation of cracked and transformed moment of inertia of R.C.
- calculation of critical points on P-M interaction diagrams for short columns, and design of short columns

Students may attend undergraduate reinforced concrete design (CEE 482, MWF 10:00 to 10:50 a.m. in 643 Baldwin Hall) to review these topics as needed.

Scope: The course includes the topics listed in Table 1. Reading assignments from your textbook are listed. Additional reading materials will be made available on Blackboard.

Course Organization:

- Assignments will include reading from the text and from other posted materials.
- Homework problems will be assigned on a regular basis to illustrate course materials. Assigned problems will be due on days to be announced in class. Normally, one week will be allowed for completion of problems.

- One midterm and a comprehensive final exam will be given.

Grading:

The following approximate weights will be used for grading:

Homework 35%  
 Midterm 30%  
 Final 35%

**Table 1 List of Topics and Dates**

<u>Topics</u>	<u>Coverage</u>
Introduction, design methods, limit states	Ch. 1, Ch. 2, Notes
Properties of reinforcing steel and concrete, biaxial and triaxial state of stress, models for confined concrete	Ch. 3, Notes
Flexural behavior and design of beams, design vs. theoretical flexural capacity of beams, basis of code provisions, stress-block parameters for high-strength concrete, use of XTRACT	Ch. 4, Ch. 5, Notes
Serviceability of R.C. members, crack control of deep members, long-term deflection, creep and shrinkage deflections, use of moment-curvature	Ch. 9, Notes
Behavior and design of short columns, design vs. theoretical column capacity, scrutiny of code provisions, biaxial bending, use of XTRACT	Ch. 11, Notes
Bond mechanisms, anchorage, splice, ACI 318-05 provisions	Ch. 8