SACRAMENTO STATE
Construction Management

CM 150
Structures III: Reinforced Concrete & Masonry Design

Course Syllabus
Fall 2008

Instructor: Tony Tipton, PE

Lecture: MW 4:30-5:45pm
Location: Calaveras Hall 141

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Office Hours: RVR 4019 (Professor Anderson)
MW 10:00am-12:00pm or by

CM 150: Structures III – Concrete & Masonry

COURSE DESCRIPTION:
This course introduces basic design concepts of reinforced concrete and reinforced masonry design. Topics and examples include design of beams, slabs, columns and walls. Students are required to demonstrate drafting ability. Assignments include design and drawings of various structural systems. **3 units.**

Reinforced Masonry topics: Design and safety concepts; material properties; analysis and design of beams, cantilever walls, bearing walls, shear walls, and other elements.

Reinforced Concrete topics: Design and safety concepts; material properties; analysis and design of reinforced concrete beams, columns, and other structural elements or structures. Design conforming to ACI 318-99 Building Code requirements is emphasized.

PREREQUISITES:
The prerequisite course(s) for this class, which must have been completed with a C- or better grade, include CM 140. One hundred series CM courses are limited to students whose changes of major to the upper division have been approved by the Program Coordinator.

ACADEMIC HONESTY & GRADING SYSTEM:
All students are subject to the policies described in the University Catalogue. In particular, students should be familiar with policies described on pages 104 – 112 and page 339 of the 2004-2006 CSUS Catalogue.

Giving aid to a student during an exam or taking information from another student or student's exam constitutes academic dishonesty. Students caught cheating during an exam will receive a failing grade in the course and can be dismissed from the university. Students are encouraged to work together to solve homework problems, but **copying is obviously prohibited.**

Grades will be assigned based on the student's performance as measured by the assigned homework, midterm exams, and final exam. Grading shall be in accordance with the University's grading policy as outlined in the section entitled "Grading System" in the current copy of the University catalog.

Grade Scale:
A: 90-100 B: 80-89
C: 70-79 D: 60-69
F: <60

Homework	20%
Midterm Exam #1	30%
Midterm Exam #2	30%
Team Project	20%

*Students achieving overall percentages as shown above are guaranteed grades as indicated. Actual cutoffs may be lower.

COURSE OBJECTIVES:

The purposes of this course are to:

- Understand the uniform building code requirements for the construction of reinforced masonry and reinforced concrete structures, including testing criteria and quality assurance
- Adequately design the reinforcing steel and masonry compressive strength for masonry walls, beams, and pilasters to withstand vertical and lateral loads
- Properly design the reinforcing steel and concrete compressive strength for concrete beams, one-way slabs, two-way slabs, columns, retaining walls, and foundations to withstand vertical and lateral loads
- Calculate anchorage bolts capacities for common connections into reinforced concrete structures

SPECIFIC EDUCATIONAL OUTCOMES:

At the conclusion of the class, students should be able to:

- Describe fundamental properties of masonry, concrete and reinforcing steel.
- Understand the CBC requirements for placement, testing, and inspection of reinforced masonry and concrete.
- Analyze and design reinforced masonry beams for bending, shear, and deflection.
- Analyze and design reinforced masonry columns & bearing walls for axial and out-of-plane bending loads.
- Analyze and design reinforced masonry shear walls for in-plane lateral loads.
- Calculate anchorage requirements due to out-of-plane seismic loads for reinforced concrete and masonry walls.
- Determine development lengths for properly anchoring reinforcing steel in concrete and masonry.
- Analyze and design reinforced concrete beams for bending, shear, and deflection.
- Design reinforced concrete slabs, one-way & two-way (waffle type), for vertical design loads
- Analyze and design reinforced concrete retaining walls.
- Design reinforced concrete footings for one-way shear, punching shear, and overturning stability.
- Strengthen skills for drawing shear and bending moment diagrams.
- Solve problems using fundamental principles in a logical and systematic way.
- Idealize problems using mathematical models.
- Draw free body diagrams.
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TEXTBOOKS:

Gregg E. Brandow, Chukwuma Ekwueme and Gary C. Hart
2006 Design of Reinforced Masonry Structures 5th Edition
http://www.cmacn.org/bookstore-CMACN.htm
Call: CMACN (916) 722-1700 (half price if you call direct)
(Required)

Nilson, Darwin, & Dolan, *Design of Concrete Structures*, 13th Edition, McGraw-Hill, New York, NY, 2004. Available on CSUS library reserves, 2 hour check-out. **(Recommended)**

REFERENCES:

Amrhein, *Reinforced Masonry Engineering Handbook*, Masonry Institute of America, California, 1998.

Masonry Institute of America, *Masonry Codes & Specifications*, Latest Ed., California.

American Concrete Institute (ACI) Committee, *Building Code Requirements for Structural (Reinforced) Concrete*, ACI 318-99 Ed., American Concrete Insititute, Missouri, 1999.

ASCE Standard #7-02, *Minimum Design Loads for Buildings and Other Structures*, 2003 Ed., American Society of Civil Engineers (ASCE) Publications, Virginia.

ICBO & Building Standards Commission, *Uniform Building Code (UBC) – Volume 2: Structural Engineering Design Provisions*, 2004 Ed., International Conference of Building Officials (ICBO), California.

ASCE Standard #37-02, *Design Loads on Structures During Construction*, 2003 Ed., American Society of Civil Engineers (ASCE) Publications, Virginia.

COURSE ORGANIZATION & EVALUATION:

Lecture Sessions

Attendance is strongly recommended. Lecture sessions will be one hour and fifteen minutes in length, and held two times per week. Classes will be devoted to the presentation of lecture topics, a brief review of the assignments, administering exams, and addressing individual questions as time allows. To maximize learning, you are encouraged to participate actively in lecture. You will also have the opportunity to work in small groups to solve problems in/out of the classroom.

Course Web Page

A CM 150 course web page will be developed through the CSUS Web CT. It is **important** for you to have a SacLink account to utilize the tools of this course web page. You will be expected to check your Saclink email and the course web page regularly (i.e., daily) for important class announcements, homework assignments & solutions, and other information. You must send all email to me during the semester with **"CM150" somewhere in the "subject line".** Email without this designation will not be recognized or responded to (i.e., I will assume that it has not been submitted).

Classroom Interruptions

The lecture sessions should be treated in a professional manner, as you would behave during a meeting with a client/contractor. All cellular phones and pagers to be turned off prior to entering lecture sessions and exams. Use of classroom computers during the lecture will also not be allowed. Any violation of these warnings will result in dismissal of the student from that day's lecture.

Homework Policy — No Lates — Assigned Wed - Due Monday

Homework problems will be assigned regularly. Assignments must be turned in at the **beginning** of class on the due date, typically two periods after they have been assigned. A maximum of 2 late homeworks will be accepted at the beginning of the next class period, with a ~~**20% penalty**~~. No homework may be submitted after an assignment is returned or after solutions are provided.

Homework must be neat and organized, and completed using a straight edge and engineering paper (front side only). Final answers must be boxed or underlined for clarity and **engineering units must be used in solving problems and shown on final answer to receive credit**. Homework sheets must be stapled, with name at the top of each page.

Homework will be reviewed for completion of all assigned problems, but not all of the assigned problems will necessarily be graded. However, solutions of all problems will be posted on Web CT and should be reviewed. Max 2 problems per sheet

Exams Policy

Two seventy-five minute midterm exams will be given as noted on the exam schedule below. These midterm exams will be returned for review in class, but will be collected and remained on file in the instructor's office for a minimum period of one year. Any appeal on the scoring of an exam must be made at the first lecture period following return of the midterm exam.

A two hour final exam will be given as determined by the University Final Exam Schedule (noted on the exam schedule below). Final exams will not be returned, but will remain on file in the instructor's office for a minimum period of one year. During this time, the student may schedule an appointment with the instructor to review his/her final exam.

Exam Dates (tentative)

Midterm Exam #1	Wednesday, October15, 2007	(Week 7)
Midterm Exam #2	Wednesday, December 3, 2007	(Week 14)
Team Projects	TBD	

Students may bring one 8.5 x 11 sheet (both sides) to the first exam, and an additional sheet for each subsequent exam. These sheets must be your own hand written notes. The instructor will collect and review these sheets. Makeup exams will be given only if *prior permission* is granted for extreme situations such as valid medical reasons.

Evaluations

Students are encouraged to provide constructive feedback to the instructor during the semester through "student representatives" and will also formally evaluate the instructor during the last week of class using the standard evaluation form.

CM 150 – LECTURE SCHEDULE (Tentative)
Fall 2007

Date	Lecture	Topic	Reference
9/3	1	Introduction to reinforced masonry design	CMU Text, 1.1 – 1.7
9/8	2	CBC construction requirements	CMU Text, 1.8 – 1.9
9/10	3	CBC quality assurance & review design loads/tributary areas	CMU Text, 2.1 – 2.7
9/15	4	Working stress design: theory & methods	
9/17	5	Beam design: flexural stress (bending)	CMU Text, 4.1 – 4.4
9/22	6	Beam design: shear stress	CMU Text, 4.5
9/24	7	Bearing wall design: axial & flexure	CMU Text, 4.7 – 4.8
9/29	8	CMU pilaster (column) design: axial only	CMU Text, 4.6
10/1	9	Shear wall design: in-plane lateral loads	CMU Text, 4.9
10/6	10	Shear wall design: in-plane lateral loads	CMU Text, 4.9
10/8	11	Wall anchorage design: out-of-plane seismic loads	CMU Text, 1.10
10/13	12	Reinforcing steel – development lengths	CMU Text, 1.11
10/15	13	**Midterm #1: MASONRY DESIGN**	
10/20	14	Introduction to reinforced concrete design	Concrete Text, 1.1 – 1.9
10/22	15	Concrete materials, quality control, admixtures, and properties	Concrete Text, 2.1 – 2.12
10/27	16	Strength design: theory & methods	Concrete Text, 3.1 – 3.3
10/29	17	Beam design: flexural stress (bending)	Concrete Text, 3.4 – 3.8
11/3	18	Beam design: shear stress	Concrete Text, 4.1 – 4.5
11/5	19	Retaining Wall design	Concrete Text, 17.1 – 17.8
11/10	20	One-way slab design	Concrete Text, 13.1 – 13.3
11/12	21	Uniform slab design: strip method	Concrete Text, 13.4 – 13.7
11/17	22	Two-way "waffle" slab design	Concrete Text, 15.1 – 15.4
11/19	23	Footing design: overturning stability	Concrete Text, 16.1 – 16.4
11/24	24	Footing design: flexure, one-way shear, & punching shear HW Due	Concrete Text, 16.5 – 16.8
11/26	25	No Class	
12/1	26	Prestressing: basic design methodology Anchorage design: bolts Review	Concrete Text, Chapter 19 Concrete Text, 5.1 – 5.4
12/3	27	**Midterm #2: CONCRETE DESIGN**	
12/8	28	**TEAM PROJECTS**	
12/10	29	**TEAM PROJECTS** ← Group # 10	

DISCLAIMER:
The instructor reserves the right to adjust the scope of the course, including number and timing of exams, as necessary.

½ written ½ presentation