University of Texas, Arlington
Department of Civil Engineering

CE 5300 – EARTHQUAKE-RESISTANT DESIGN OF REINFORCED CONCRETE STRUCTURES

Summer 2011

Prerequisite: CE 4347 Reinforced Concrete Design or Equivalent

Instructor: Dr. Shih-Ho Chao

Office: NH, RM 407
Phone: 817-272-2550
shchao@uta.edu

Lectures: From June 7 to August 11: Tuesdays and Thursdays, 10:30 AM-12:20 PM, NH 111

Office Hrs:

- Tuesdays and Thursdays, 2:30 PM-5:00 PM
- Questions via e-mail
- Or by appointment

Textbook:

Reinforced Concrete Design of Tall Buildings by Bungale S. Taranath, CRC Press, 2010.

References:

- ACI Committee 318 (2008), Building Code Requirements for Structural Concrete (ACI 318-08) and Commentary (ACI 318-08), American Concrete Institute, Farmington Hills, Michigan.
- IBC (2009), International Building Code, International Code Council, Washington, DC.
- ASCE7-10 (2010), Minimum design load for buildings and other structures. American Society of Civil Engineers, Reston (VA).

GTA:

Sanputt "Pat" Simasathien

E-mail: sanputt.simasathien@mavs.uta.edu
(Lab) Phone number: 817/272-9163

He is generally available all day from 9AM to 5PM during weekdays.

Course Outline:

1. Earthquake Effects on Buildings
2. Reinforced Concrete (RC) Seismic Resisting Systems
3. Lessons from Earthquake Damage
4. Earthquake Loads Based on IBC 2009 and ASCE 7-10
5. Inelastic Behavior of Reinforced Concrete Members Subjected to Seismic loading
   - Material properties beyond the elastic range;
   - Moment-curvature relationship for beams;
   - Axial load-moment-curvature relationship for columns;
   - Shear considerations for reinforced concrete members;
   - Behavior of reinforced concrete members subjected to large load reversals
6. Design of RC Special Moment Frames
   - Design flexural members of special moment frames;
   - Design special moment frame members subjected to bending and axial load;
   - Design joints of special moment frames
7. Design of RC Special Structural Walls
8. Design of RC Coupling Beams
9. Design of RC Diaphragms, Chords, and Collectors (if time allows)

Computer Programs:

- *StructurePoint package* (http://www.structurepoint.org/): *spBeam, spColumn spSlab, spWall, spMats)* is available in RM 226. The user's manual can be found under one of the folders.

- *RISA-3D* (http://www.risatech.com/p_risa3d.html) is available in RM 226. The user's manual can be found under one of the folders.

- Access to computer lab (RM 226): **username: ce5300; password: nebula, door: 102-0594**. Please contact Lewis Crow (lcrow@uta.edu) if you have any problem in running this program.

Homework:

- Homework problems will be assigned each Tuesday (or Thursday) and are generally due on the following Tuesday (or Thursday). All homework will be counted towards the final grade.
- Homework will be collected at the beginning of class on the due date. A late homework loses 30% per day.
- Students are encouraged to see the GTA and instructor about those assigned problems the student is having trouble with.
- Students are also encouraged to work in small groups to develop solutions to the problems but each student must write up his/her own homework. No credit will be given for homework copied or if your homework has been copied.

Term Project:

Students will be divided into a few groups and each group will be designing a reinforced concrete building according to current codes. Project details will be announced after the mid-term exam. Final presentation of the term project is on Thursday August 11 during lecture and the report (both hardcopy and electronic copy) is due on the same date.

Examinations:

There will be one mid-term exam (in class) and a final examination (comprehensive exam). Open book and notes. All answers for the exam problems must be justified. It is important to have numerical answers within a reasonable accuracy (+ or -2%). Wrong numerical answers will not be assigned more than 80% of grade. Seats will be assigned for all exams.

Scheduled exam dates are:

Mid-term: July 19 (Tuesday), 10:30 AM-12:30 PM; NH 111
Final exam: August 16 (Tuesday), 10:30 AM-12:30 PM; NH 111

Make-up Exam Policy:

Makeup exams are given only in extreme circumstances; examples of extreme circumstances are serious illness of the student (doctor's note required) or death in the family. I must be contacted before the exam if such a circumstance applies to you.

Grading Policy:

The course grade will be based on:

20% - Homework
20% - Term project
30% - Mid-term exam
30% - Final exam

100%

Final exam will not be returned, but may be reviewed by students.

The grade assigned to the student's numerical average will be as follows:

(a)	90 to 100 average	=	A
(b)	80 to 89.9 average	=	B
(c)	70 to 79.9 average	=	C
(d)	60 to 69.9 average	=	D
(e)	< 60 average	=	F

Drop Policy:

Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information.

Attendance Policy:

Attend class regularly; however since there is a distance education component of this course so you can watch the recorded video if you have to miss some classes.

Student Learning Outcomes:

To develop an understanding of performance of reinforced concrete members under inelastic deformation, and design methodology for seismic design of reinforced concrete structural elements. In addition this course will focus on the following:

a. Apply knowledge of mathematics, science and engineering
b. Designing a component to meet desired needs
c. Identify, formulate, and solve engineering problems
d. Understanding professional & ethical responsibilities
e. Understand the impact of an engineering solution in a global and societal context
f. Recognize the need for engineering in life-long learning
g. Knowledge of contemporary civil engineering issues
h. Using technique, skills and modern engineering tools

Americans with Disabilities Act:

The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Academic Integrity:

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. According to the UT System Regents' Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

Student Support Services Available:

University of Texas at Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. These resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals to resources for any reason, students may contact the Maverick Resource Hotline at 817-272-6107 or visit www.uta.edu/resources for more information.

Librarian to Contact:

Sylvia George-williams (Sylvia@uta.edu), Science & Engineering Librarian.

Electronic Communication Policy:

The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. Students are responsible for checking their MavMail regularly. Information about activating and using MavMail is available at http://www.uta.edu/oit/email/ There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

To obtain your NetID or for logon assistance, visit https://webapps.uta.edu/oit/selfservice/. If you are unable to resolve your issue from the Self-Service website, contact the Helpdesk at helpdesk@uta.edu.

Note: I will be using email very often to send class handouts, homework assignments, and announcement; reply questions from students, etc. Please send me your preferred email address if you do not check UTA email.

Final Review Week:

A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. Classes are held as scheduled during this week and lectures and presentations may be given.