CES 4702 Spring 2010
ANALYSIS AND DESIGN IN REINFORCED CONCRETE
FLG 270 TR 3rd and 4th (9:35 – 11:30)

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Required Texts: ACI Committee 318-08, ***Building Code Requirements for Reinforced Concrete***, American Concrete Institute, Detroit, 2008. Can be ordered in class for $65.

Reinforced Concrete, Mechanics and Design, James G. MacGregor, and James K. Wight, Fifth Edition, Prentice Hall, New Jersey, 2008.

Objectives: This course will provide the basics in strength analysis and design of reinforced concrete including: flexure, shear, axial load, and development of reinforcement. Serviceability requirements related to deflections and cracking will also be presented.

To be adequately prepared for this course you need to have the following skills:

Skill	Course
1. Determine the shear and moment diagrams for determinate beams using statics including calculating the values of key points and sketching the diagrams correctly	CES 3102
2. Sketch the shear and moment diagrams for a continuous beam with a uniformly distributed load.	CES 3102
3. Calculate the moment of inertia of a composite section composed of two materials with different moduli.	EGM 3520
4. Calculate the stresses in a composite section composed of two materials with different moduli.	EGM 3520
5. Understand testing procedures and material behavior of concrete and reinforcing steel.	CGN 3501
6. Calculate the deflection of a beam using deflection formulas	CES 3102

Grading:

Homework	15%
Quizzes	85%

Final grade scale (could be adjusted downward but not up):

A	93+	D+	69-70
A-	91-92	D	63-68
B+	89-90	D-	61-62
B	83-88	E	< 61%
B-	81-82		
C+	79-80		
C	73-78		
C-	71-72		

General Notes and Policy:

1. Homework and items to study are at: http://www.ce.ufl.edu/~rac/courses/CES%204702/

2. Quizzes - Nine one-hour quizzes will be given during the semester at an interval of approximately two-weeks. The final quiz average will be calculated from the eight highest scores. Consequently, make-up exams will only be given in the very rare case when there are two unavoidable emergencies in one semester. Emergencies, among other things, do not include job interviews, nonrefundable airplane tickets purchased, etc.. Requests for quiz make-up for medical and other emergencies must be accompanied by proper documentation.

3. The text book and class notes are not allowed during quizzes. ACI 318-08 will be allowed.

4. Class attendance will not be taken but you are strongly urged to attend all sessions. The most important information for understanding reinforced concrete from the text and ACI 318-08 will be presented in class as well as the final dates for quizzes. The text has 1112 pages and ACI 318-08 has 465 pages (total 1577 pages). Please plan to attend class – it will pay off!

5. Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

6. Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

7. UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
   - University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
   - University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling. SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
   - Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
   - Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Homework:

Engineers communicate ideas through their design calculations and construction documents. Many times final engineering calculations are submitted to clients or as a part of the construction permitting process. These calculations are a reflection of your competency as an engineer and on the quality of product that your company produces. Part of your engineering training includes learning how to prepare engineering calculations neatly and in the proper format.

1. Homework is due on the date announced in class. Late homework will not be accepted. Solutions will be posted in Weil 475 and on the class web page.

2. Homework (excluding those completed in MathCAD) should be completed on engineering paper, one side only (opposite side of lines). All written work should be done in pencil. All straight lines must be drawn with a straight edge.

3. Each page should have the student's name, date, course number, homework set number, and page number (including MathCAD – use the header function). The page number should be written in the form of a fraction, with the numerator being the current page and the denominator being the total number of pages in the set. You may need to include printouts of computer work in your submittal. If so, these pages must also contain the information given above.

4. Start each new problem on a clean sheet of paper. Clearly state the problem and list other information given in the problem statement (material properties, loads, dimensions, etc.). Draw and label the associated sketch (if any). You may cut and paste the original problem statement, if you wish.

5. Format the calculations in the form of an outline. Describe each step in the solution process. In addition to making the calculations easier for others to read, this will help you organize your thought process.

6. Label answers and results clearly. Comment on answers that require comparison or decisions.

7. When you are given a task as a structural engineer your finished product is generally a drawing that a contractor can use for construction. The finished product for the design projects will be a detailed sketch (sketch does not imply the absence of a straight edge) made to an appropriate architectural scale.

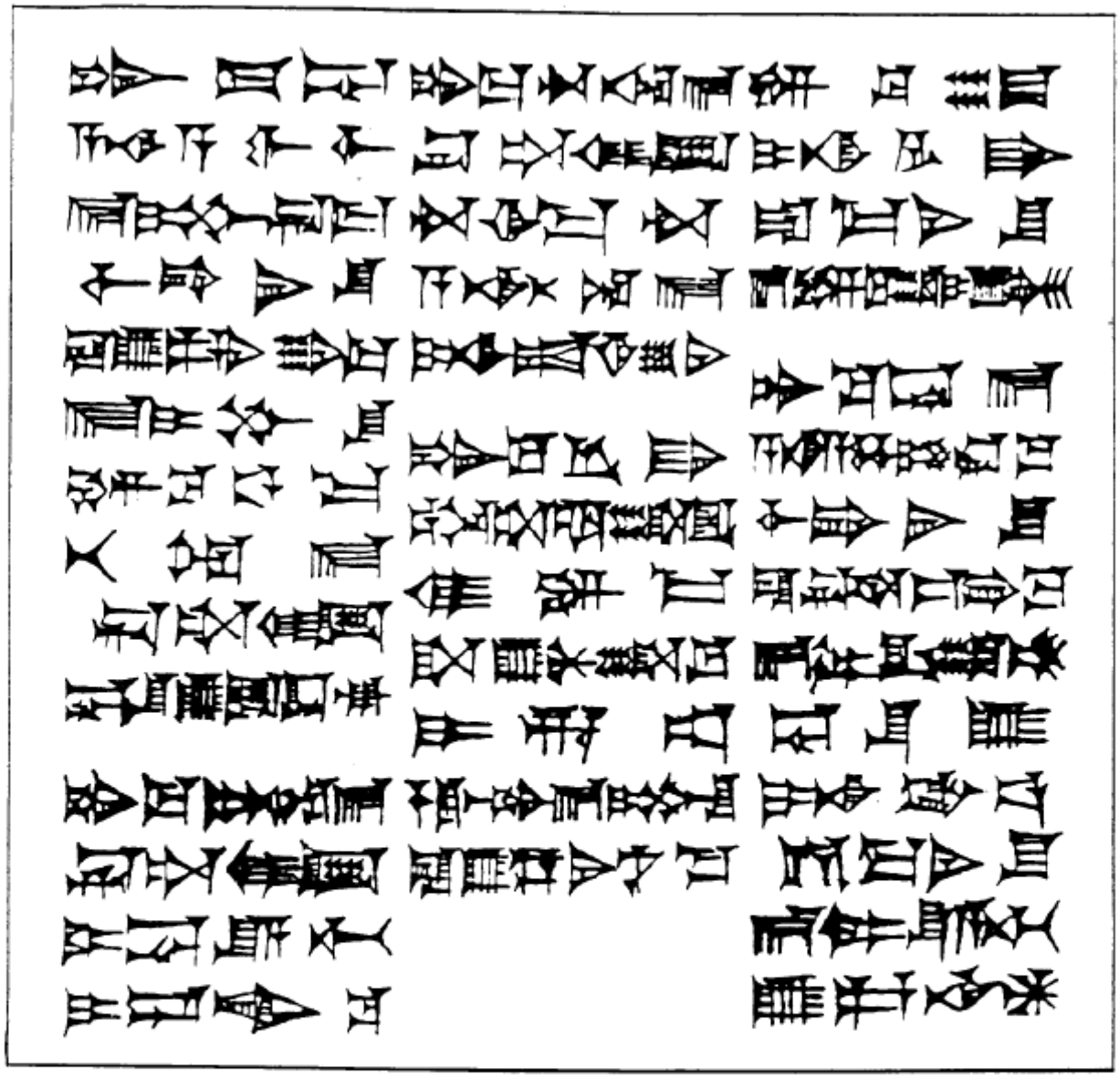
8. Do not skip steps in the solution process, even if you think you know the answer! If you make an assumption, state it clearly.

9. Significant figures: Usually three is sufficient but never more than four. Points will be deducted for using too many significant figures!

TOPICS COVERED IN CES 4702

Subject (approximate lecture hours)	ACI 318-08	Text
1. Introduction (4)		
Codes and Loads	1-2	1
Design Methods	8.1-8.2, 9.1-9.4	2
Materials	3-5, 8.5	3
2. Flexure: behavior and singly reinforced beams (4)		
Introduction	10.1-10.5	4.1-4.2
Single reinforced sections		4.3-4.6
3. Flexure: compression reinforcement and T-beams (4)		
Compression reinforcement		4.7
T-beams	8.10	4.8
4. Flexure: design (5)	8.3-8.10	5
Beams		
One-way slabs		
5. Shear (5)	11.1-11.5	6.1-6.6
6. Anchorage of reinforcement (5)	7 & 12	8
Development length		
Standard hooks		
Cut-off points		
Splices		
7. Requirements under service loads (5)		9.1-9.2
Cracking	10.6	9.3
Deflections	9.5	9.4-9.5
8. Columns (7)	10.8-10.14	
Short columns, axial load & bending		11.1-11.6
Slenderness effect		12.1-12.6
9. Footings (2)	11.11, 15	15
10. Anchorage to concrete structures (1)	Appendix D	
11. Prestressed concrete (1)	18	

Tentative Quiz Schedule		
Quiz #	Date	Subjects
1	Jan 19	1
2	Jan 28	2
3	Feb 9	3
4	Feb 25	4
5	Mar 4	5
6	Mar 23	6
7	Apr 1	7
8	Apr 13	8
9	Apr 20	9-11



FROM THE CODE OF HAMMURABI (2200 B.C.)

IF A BUILDER BUILDS A HOUSE FOR A MAN AND DOES NOT MAKE ITS CONSTRUCTION FIRM AND THE HOUSE COLLAPSES AND CAUSES THE DEATH OF THE OWNER OF THE HOUSE—THAT BUILDER SHALL BE PUT TO DEATH. IF IT CAUSES THE DEATH OF A SON OF THE OWNER—THEY SHALL PUT TO DEATH A SON OF THAT BUILDER. IF IT CAUSES THE DEATH OF A SLAVE OF THE OWNER—HE SHALL GIVE TO THE OWNER A SLAVE OF EQUAL VALUE. IF IT DESTROYS PROPERTY—HE SHALL RESTORE WHATEVER IT DESTROYED AND BECAUSE HE DID NOT MAKE THE HOUSE FIRM HE SHALL REBUILD THE HOUSE WHICH COLLAPSED AT HIS OWN EXPENSE. IF A BUILDER BUILDS A HOUSE AND DOES NOT MAKE ITS CONSTRUCTION MEET THE REQUIREMENTS AND A WALL FALLS IN—THAT BUILDER SHALL STRENGTHEN THE WALL AT HIS OWN EXPENSE.