CE 413 - Reinforced Concrete Design
Instructor: Dr. Hai Nguyen
Spring 2014

Credit: 3 hours
Lecture: Tuesday & Thursday 9:30-10:45 am, Engineering Lab. 101

Catalog Data:
CE 413 Reinforced Concrete Design - Theory of Reinforced Concrete design using ACI 318 ultimate strength methods; design of beams, one way slabs, and columns using ultimate strength design.

Textbooks:
- *Building Code Requirements for Reinforced Concrete (ACI 318-11) and Commentary (ACI 318R-11)*, American Concrete Institute, 2011.

Other References:
- Class Handouts.

Office Hours:
Tuesdays 02:00-04.30 pm
Thursdays 02:00-04:30 pm
Fridays 11:00-12:00 am
For those of you who will not be able to meet the instructor during the assigned office hours, the instructor has an open door policy, which means that you are welcome to come and ask him by appointment or at an appropriate time.

Contact Information:  Dr. Hai Nguyen
College of Information Technology and Engineering
Gullickson Hall, Room 206-D
E-mail: nguyenhai@marshall.edu

Prerequisites:
- CE 312 Structural Analysis
Objectives:

- To have the students learn behavior and design of reinforced concrete members and structures, enough to be immediately useful in design of reinforced concrete beams, walls, slabs, and columns using ACI-318. The ultimate strength design method will be covered.
- To correctly answer reinforced concrete questions on the structural engineer and EIT/PE exams.
- In addition, to prepare students for lifetime learning as reinforced concrete design evolves, and to form a foundation for possible graduate study in the subject.

Outcomes:

With the successful completion of the course, the student should be able to:

- Understand the ultimate strength design methodology
- Analyze and design singly reinforced concrete beams
- Analyze and design doubly reinforced beams
- Analyze and design reinforced concrete T-beams
- Analyze and design one-way reinforced concrete slabs
- Design for shear strength of beams
- Analyze and design reinforced concrete retaining walls
- Determine crack widths and deflections of reinforced concrete beams
- Analyze and design axially loaded short reinforced concrete columns
- Analyze and design eccentrically loaded short reinforced concrete columns
- Determine development lengths of straight bars in tension and compression
- Determine development lengths of hooks
- Learn the art of detailing different reinforced concrete elements

Topics:

- Review material properties of concrete
- Steel versus concrete.
- Design philosophies - working stress design, ultimate strength design, serviceability limit states, safety factors, loads.
- Ultimate strength design of singly reinforced beams
- Ultimate strength design of doubly reinforced beams
- Ultimate strength design of T-beams
- Ultimate strength design of one-way slab
- Shear and diagonal tension
- Ultimate strength design of retaining walls
- Deflection and cracking
- Axially loaded columns
- Eccentrically loaded columns
- Development lengths
- Detailing of longitudinal and transverse reinforcement.

* The instructor reserves the right to slightly change the topics and their order to achieve the maximum benefit of the course learning outcomes.

Contribution to Program Outcomes:

1. an ability to apply knowledge of mathematics, science, and engineering
2. an ability to design civil engineering projects or components of projects to meet desired needs
3. an ability to identify, formulate, and solve civil engineering problems
4. a recognition of the need to engage in life-long learning
5. an ability to engage in life long learning
11. an ability to use techniques, skills, and modern engineering tools necessary for engineering practice
12. an ability to apply sound safety practices in laboratory and design work

Course Relevance & Contribution to Professional Component of Program Curriculum:
- Reinforced concrete is one of the major building materials presently in use all over the world. It appears likely to remain so for the foreseeable future. Course emphasis on material and member behavior related to characteristics should enable students to remain current with design paradigms as they change with the introduction of modified and new constituents.
- The course utilizes the most recent ACI design code (required text) that is used in professional practice. The entire course is devoted to component design as outlined in the topic descriptions

Assessment:
All learning outcomes will be accessed through questions in class and the evaluations of homework assignments and examination problems.

Computer Usage:
- Excel spreadsheets
- Structural Engineering Software
- Electronic mail for effective communication between the professor and students
- Research in library resources for references

Accreditation Category Content:
- Engineering Science: 0.0 credits (0.0%)
- Engineering Design: 3.0 credits (100.0%)

Homework Assignments:
- Homework will regularly be assigned either during the class time or by e-mail.
- Checking your e-mail is required on a daily-basis for information regarding homework assignment. Homework must be submitted before the starting time of class on the assignment date.
- Late homework is not acceptable except for unusual circumstances, e.g., an excused absence. No late homework will be accepted after the final day of classes for the semester.
- You are expected to provide your homework on engineering papers - not a Xerox copy.
- Homework must be typed or clearly written, neat, and must conform to acceptable Standards of Engineering Computation.

Exams:
- Two exams and a final will be given during the course of the semester.
- No makeup exams will be given with the exception of unusual circumstances that are consistent with Marshall University Policies. Make-up exams will be scheduled at my convenience and will only be scheduled once.

Grading Policy:
- Homework Assignments 30%
- Attendance 5%
- Exam 1 15%
- Exam 2 20%
- Final Exam 30%
- Total 100%
The instructor will not discuss the grades in e-mails or phone calls.

Attendance:
The golden rule: Do not disturb the class and/or your classmate(s)
This includes but not limited to:
- Late for class. If you are late, enter the classroom in the least intrusive way possible.
- Sleeping during class. Students who sleep during class will be asked to leave the classroom.
- Leaving class early without proper excuse will be counted as an absent.
- Loud electronic devices. Turn all cell phone, MP3 player, radio, TVs, etc. off or to silent before class starts.
- Answering phone and texting in class. If it is an emergency and you need to answer your cell phone, please step out of the class and walk away for a good distance before answering the phone. Texting is not allowed in any circumstances.
- Eating during class. Students may bring drinks that have proper lids.
- All laptops must be off with the lid closed during discussions and lectures.
- Any other manners that disturbs the class as determined by the instructor.

You are expected to attend all lectures and labs. However, the instructor accepts your absence for one session provided that an advance notice will be given; unless this is unavoidable. Non-excused absence for few lecture/lab sessions may be dealt with in accordance with the attendance policy of the course and Marshall University policies.

Letter Grade Scale:

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<tr>
<th>Grade</th>
<th>Description</th>
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<tr>
<td>90-100</td>
<td>A</td>
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<td>80-89</td>
<td>B</td>
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<td>70-79</td>
<td>C</td>
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<td>60-69</td>
<td>D</td>
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<tr>
<td>0-59</td>
<td>F</td>
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The instructor does reserve the right to slightly adjust or scale the grades based on class groupings.

Engineering Ethics and Academic Honesty:

It will be assumed that each student subscribes to a professional code of ethics that is the basis for his/her behavior in class. Any and every case where the professional code of ethics and academic honesty are violated will be dealt with in accordance with the Marshall University Student Handbook and the governing provisions of Marshall University. Any student caught cheating will immediately fail the course. Cheating is defined to include copying from fellow students, helping another person on a test or quiz, being in the possession of material that would enable one to cheat, and having on your person or nearby any books, notes, papers, etc. that have not been approved by the instructor beforehand. Paper will be provided for hourly exams, so no student will be allowed to bring anything to a closed-book test except for pencils, timepiece, erasers, straightedge, and calculator (Casio fx-115 ES or equivalent). The storage of class information in programmable calculators is considered cheating. During exams, all cell phones must be turned off and secured in your backpack or locker—a cell phone visible at your desk will be considered a cheating offense. Also, no one will be allowed to wear a cap or hat during exams.

Policy for Students with Disabilities:
Marshall University is committed to equal opportunity in education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Office of Disabled Student Services (DSS) in Prichard Hall 117, phone 304 696-2271 to provide documentation of their disability. Following this, the DSS Coordinator will send a letter to each of the student’s instructors outlining the academic accommodation he/she will need to ensure equality in classroom experiences, outside assignment, testing and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, please visit http://www.marshall.edu/disabled or contact Disabled Student Services Office at Prichard Hall 11, phone 304-696-2271.