CEE 461 – Design of Reinforced Concrete Structures I **Spring 2025**

(Information is subject to change)

Class: 10:00 a.m. – 11:50 a.m.; T-R
Newmark 2311

Texts:

1. *ACI 318 Building Code and Commentary,* American Concrete Institute, Report ACI 318-19 (22), Farmington Hills, MI. ***Required***
   Purchase through ACI as print or pdf,* ***must join as free student member**, this code is updated regularly*

2. *Reinforced Concrete Mechanics and Design*, James K. Wight, Prentice Hall, © 2014. ISBN-10: 013348596X ***Recommended***
   ** There is a new version that has been updated for the 2019 code*

3. *The Reinforced Concrete Design Handbook Vol. 1,* American Concrete Institute, Special Publication-17, 2014 ***Recommended***
   **Purchase through ACI as print or pdf, these have not been update for the new code references yet.*

Instructional staff: Prof. Henschen, 2129D; 217-300-6472; jhensche@illinois.edu
Office Hours: TBD or by appointment

Grader: Mackenzie Kimble; mkimbl3@illinois.edu

Course Info: Information for the course will be posted to the course **Canvas** site. Homework will be on Gradescope (integrated with Canvas)

Credits: 3 credits

Prerequisite: CEE 360 – Introduction to Structural Engineering

Student Learning Objectives:

The faculty of the Department of Civil Engineering have identified nine student outcomes (SO). These student outcomes are skills that graduates from the civil engineering department will possess upon graduation. This course supports the following program outcomes.

1. **Demonstrate an ability to identify formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics**
2. **Demonstrate an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors**
3. **Demonstrate an ability to communicate effectively with a range of audiences**

Course Objectives:

At the end of the course students should be able to:

1. Use service loads with appropriate load combinations to obtain factored loads.
2. Use the ACI 318 manual to design flexural members
3. Use the ACI 318 manual to design 1-way slab members
4. Use the ACI 318 manual to design compression members
5. Use the ACI 318 manual to design beam-column members
6. Use the ACI 318 manual to design of concrete foundation elements
7. Use the ACI 318 manual to design reinforcement layouts.

Academic Integrity:

Academic integrity is expected; it is the responsibility of the student to refrain from such infractions as cheating, fabrication, and plagiarism in *any* aspect of the course. The definitions of, and university policies on, academic integrity are explained in Article 1, Part 4 of the Illinois student code (http://admin.illinois.edu/policy/code/). Any assignment where plagiarism or other forms of cheating has been determined to occur will receive a score of zero. Any student who has been determined to plagiarize, cheat or fabricate more than once in this class during the course of the semester will receive a failing grade for the course. All questions of academic integrity will be will be handled through the established college of engineering procedure (FAIR system), which follows the student code. Please note the Illinois CEE honor code pledge: *I pledge to uphold the highest levels of professional and personal integrity in all of my actions, including 1) never assisting or receiving unfair assistance during exams, 2) never assisting or receiving assistance on class assignments beyond that specified by an instructor, and 3) always fully contributing to group activities that are part of a course activity.*

Grading:

Exam #1	20%
Exam #2	20%
Final Exam	25%
Homework and Quizzes	10%
Class Exercises	5%
Group project	20%

Final class grades will be awarded based on the total percentage of points earned:

93-100	A	73-77	C
90-93	A-	70-73	C-
87-90	B+	67-70	D+
83-87	B	63-67	D
80-83	B-	60-63	D-
77-80	C+	<60	F

Grading scale is subject to change. This represents the highest range. If you reach these ranges you are guaranteed the above grades.

Exams and Quizzes:

Exam #1	February 27
Exam #2	April 17
Final Exam	TBD (follow university schedule)

Quizzes may be given periodically in class and will count as a homework assignment. Since the final date and time is set, you must plan your travel to accommodate the exam time. Alternate final exam times will only be given for an excused absence

Student expectations:

Lectures will be held in the assigned classroom of 2311 in Newmark. The lectures are critical to attend and be prepared to take notes. Lecture notes will not be shared for unexcused absences. Excused absences must be communicated prior with the instructor. While in lecture, please respect your classmates by paying attention and avoiding distractions.

Homework and In-class-exercises will be assigned regularly. All assignments will be posted to and turned through the ***Canvas and then Gradescope*** page. Late homework and In-Class-Exercises (ICE) will not be accepted unless otherwise stated. Homework will follow the provided formatting requirements, and submissions not adhering to the provided formatting will receive deductions according to the provided rubric (see the Homework section of Canvas). Many of the assignments will follow a dual submission system (see the Homework section of Canvas).

For exams, this course will use the "Quiz" section of the ***Canvas*** page so students will need to plan to have a laptop/tablet available at the exam. The exam will have two components, multiple choice and design problems. Remote students will be proctored via Zoom using the same procedure from the Computer-Based Testing Facility remote testing (a camera that shows you, your screen, and workspace). Further details will be provided prior to the exam.

The *group project* will run throughout the entire semester. This project is designed to reinforce key concepts from the course and provide an opportunity to work within a group of colleagues. In the project, you will move from designing components to assembling those components into a structural system. Your participation with your group will be tracked through team feedback and self-reporting. You will receive an individual score on the project based on your contributions and the quality of the final report.

Access and Accommodations:

Be sure to work with Disability Resources and Education Services (https://www.disability.illinois.edu/) if you need accommodations. Please be ready to work with the instructor so they can be prepared to meet your needs. Transcription of the lectures will be run in Zoom by default, but if there are questions additional transcription services will be made available.

With all of the challenges students face, maintaining mental health is just as important as your physical health. If you find yourself struggling, please reach out to the University Counseling Center (http://www.counselingcenter.illinois.edu/), and they can coordinate with the instructor in necessary. For physical health issues, please communicate with the instructor so that they know how best to support you.

Class Cancellation and Absences:

Notifications of class cancellations or any other changes will be made through the course Blackboard site with as much advance notice as possible. It will be both posted on Blackboard and sent to your university e-mail address.

When an absence is excused, it is the student's responsibility to notify the instructor two weeks prior to the absence and arrange for making up missed assignments and notes. The university recognizes absences as excused when the student is participating in a music or athletic group. Additionally, the instructor will allow for assignments to be completed when there is participation in a professional organization or interview.

For absences or accommodations due to religious observations, students need to communicate with the instructor at least 2 weeks prior to the event.

Diversity in the classroom:

The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to, race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs. The College recognizes that we are learning together in the midst of the Black Lives Matter movement, that Black, Hispanic, and Indigenous voices and contributions have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course director if you feel comfortable. You can also report these behaviors to Campus Belonging Resources (https://diversity.illinois.edu/diversity-campus-culture/belonging-resources/). Based on your report, Members of the Office of the Vice Chancellor for Diversity, Equity & Inclusion staff will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.

Schedule (This is tentative and subject to change, exams will be set 2 weeks in advance)

Lecture	Date	Topic
1	21-Jan	Introduction and Materials Review
2	23-Jan	Structural Review and LRFD
3	28-Jan	Introduction to Flexure
4	30-Jan	Ductility control
5	4-Feb	Example and design
6	6-Feb	Design of reinforcement
7	11-Feb	Approximate analysis and intro to slabs
8	13-Feb	Slab Design
9	18-Feb	Slab Design
10	20-Feb	Introduction to 1-way shear
11	25-Feb	1-way shear design
12	27-Feb	Exam #1
13	4-Mar	1-way shear design
14	6-Mar	T-Beam Introduction
15	11-Mar	T-Beam Analysis and Design
16	13-Mar	T-Beam Analysis and Design
	18-Mar 20-Mar	Spring Break
17	25-Mar	Doubly reinforced Beams
18	27-Mar	Introduction to Compression members
19	1-Apr	Column Analysis
20	3-Apr	Column Design
22	8-Apr	Introduction to beam-columns
21	10-Apr	Ultimate interaction diagram
23	15-Apr	Ultimate interaction diagram
24	17-Apr	Exam #2
25	22-Apr	Beam column design
26	24-Apr	Spread footing design
27	29-Apr	Spread footing design
28	1-May	Reinforcement development
29	6-May	Reinforcement development
	TBD	Final Exam