THE UNIVERSITY OF TEXAS AT TYLER

Department of Civil and Construction Engineering and Management

CENG 4311 – Reinforced Concrete Design

(3 Credit hours)

Course Description: Design of reinforced concrete structural members; design of beams, one-way slabs, columns, footings, and connections with reference to the most recent ACI 318 design code and other supporting design documents. Development length provisions, design for serviceability, use of high-strength materials, composite construction. Introduction to precast/prestressed concrete. Three hours of lecture per week.

For Fall 2026, ACI 318-19 or later versions will serve as the governing design code for course instruction, assignments, the design project, and examinations.

Prerequisite: CENG 3325 and CENG 3434

INSTRUCTOR

Baishakhi Bose, PhD
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Phone: 903-566-7273

COURSE WEBSITE

All course materials will be managed through **Canvas**. Homework assignments, solutions, handouts, and other class-related resources will be posted there. Please make sure to check Canvas regularly for updates.

SCHEDULE

Lectures: Tuesdays and Thursdays, 8:00 AM–9:20 AM
Exams: In-person unless otherwise announced
Instructor office hours: Tuesdays and Thursdays, 9:30 AM-11 AM, RBS 1036 and by appointment

COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

- ✓ LO 1: Explain RC behavior, ACI/strength design, materials, LRFD, and introductory high-strength/composite/precast-prestressed concepts.
- ✓ LO 2: Analyze RC members under flexure, shear, and axial loading.
- ✓ LO 3: Design beams, one-way slabs, columns, footings, and basic connections.
- ✓ LO 4: Apply serviceability, durability, development length, and detailing requirements.
- ✓ LO 5: Develop and interpret reinforcement details and communicate engineering decisions.
- ✓ LO 6: Integrate analysis, design, serviceability, and detailing into a coordinated design solution.

The following table summarizes the primary course assessments used to evaluate achievement of each course learning outcome.

Course Learning Outcome	Assignments	Midterm Exam	Design Project	Final Exam
LO 1	✓	✓		✓
LO 2	✓	✓	✓	✓
LO 3	✓	✓	✓	✓
LO 4	✓		✓	✓
LO 5	✓		✓	✓
LO 6			✓	✓

A check mark indicates that the assessment addresses one or more components of the corresponding learning outcome; achievement of an outcome may be evaluated across multiple assessments.

REQUIRED TEXTS

American Concrete Institute (ACI). ACI CODE-318-19(22): Building Code Requirements for Structural Concrete and Commentary. American Concrete Institute.Lectures and other handouts will be made available via Canvas.

GRADING POLICY

Attendance & Class Participation	5%
Assignments	15%
Midterm	20%
Project	30%
Final Exam	30%

Final course grades will be assigned according to the following scale:

A: 90–100%; B: 80–89.99%; C: 70–79.99%; D: 60–69.99%; F: Below 60%

ATTENDANCE POLICY

Students are responsible for all information covered in class, regardless of whether it appears in the lecture notes or other handouts. Attendance and participation in sessions is expected.

Attendance and class participation account for 5% of the final course grade and will be assessed through periodic in-class activities, problem-solving exercises, discussions, and/or participation checks. Approved or excused absences will not reduce this portion of the grade. When appropriate, an alternative participation activity may be provided for an approved or excused absence.

Mode of Delivery and Absence Policy

This course will be delivered in-person. Students are encouraged to attend every class and are expected to attend every exam that is required of them. Please note that students who experience a disruption outside of class (e.g., illness, family emergency, religious holiday, etc.) that may result in absence, or a late assignment should contact their instructor as soon as possible. The earlier that the instructor is notified, the more likely they will be able to make accommodation. In **reasonably expected** circumstances, students should contact their instructor as soon as possible, preferably at least two weeks before the expected disruption. Your instructor will do their best to accommodate for approved absences, which may include, but are not limited to:

- University sanctioned events
- Varsity sporting events
- ROTC or other military events
- Court dates
- Religious holidays and practices

For **unexpected** circumstances, contact your instructor as soon as safely possible. A quick email, message, or call is expected prior to the missed class or assignment, unless the student is physically or mentally incapable of doing so or instructing someone else to do so. Examples of unexpected circumstances that may result in accommodation include, but are not limited to:

- Sudden illness
- Need to care for a sick family member
- Loss of internet connection or utility impacting course access
- Bereavement
- Severe weather event
- Other family emergency

Additional out-of-class meetings are available during instructor office hours or as arranged with your instructor. Student attendance at office hours is optional but encouraged. Students requiring help with specific aspects of the course should arrange individual meetings with the instructor. Class management items, such as submission of assignments, attendance, project etc., will be handled by the course instructor.

University Policies and Information for Students

Attendance, academic honesty, calculator policy, accessibility services, campus carry, tobacco-free campus, and other policies are governed by UT Tyler guidelines. Please refer to the official UT Tyler resources and current academic calendar.

The Fall 2026 census date is September 8, 2026. The last day to withdraw from one or more 15-week courses is October 30, 2026. Students should consult the appropriate university offices regarding any academic, financial aid, or other consequences associated with withdrawal.

ASSIGNMENTS

Assignments will be assigned regularly as appropriate to the course schedule. Due dates and submission requirements will be indicated on each assignment. **Unless otherwise specified, submit assignments as a single PDF file via Canvas by 12 PM on the due date.**

Late Submission: Assignments that are submitted late will be graded as normal but will receive a penalty of 10% of the total assignment points per day. For example, a 20-point assignment turned in 1 hour late will receive a 10% late penalty (or 2 points), while an assignment turned in 25 hours late will receive a 20% penalty (or 4 points). The lowest grade an assignment can receive is 0%. Note that, while every effort will be made to grade assignments in a timely manner, feedback on late assignments will likely be completed later than on time assignments based on TA availability and workload. For an excused absence, assignment due dates should be arranged with the instructor/TA.

EXAMS

There will be one midterm examination and a comprehensive final examination. The midterm examination will be held on October 8 during the regularly scheduled class time (8:00–9:20 a.m.). The final examination will be held during the official UT Tyler final examination period **on Tuesday, December 8, from 8:00–10:00 a.m.** Unless otherwise announced, both examinations will be administered in person, and students should plan accordingly.

Guidelines:

- Exams are closed notes unless otherwise announced.
- The only allowed references are your personal copies of the relevant sections of ACI 318 Building Code Requirements, along with an approved calculator.
- Manuals must be your own -borrowing or sharing is not permitted.
- Handwritten notes and tabbing within your own manual are encouraged, but no loose sheets or pasted materials may be added.
- Approved calculators must comply with the calculator policy below.
- Exam solutions will not be posted on Canvas.

Make-up Exams

- Make-up exams may be granted for approved or excused absences consistent with UT Tyler policies, including documented illness or medical emergencies, university-sanctioned activities, religious observances, military obligations, bereavement or family emergencies, or other university-recognized circumstances. For foreseeable absences, students should contact the instructor as early as possible. For unexpected circumstances, students should contact the instructor as soon as reasonably possible. Documentation may be requested when appropriate.
- Missing an exam without an approved or excused absence or without timely communication with the instructor may result in a grade of zero for that examination.

PROJECT

There will be one design project during the semester. The project is intended to integrate concepts from across the course and provide an opportunity to apply reinforced concrete analysis and design principles to a more comprehensive engineering problem. Detailed project requirements and deliverables will be provided on Canvas. The final design project will be due Thursday, December 3, 2026, by 12:00 PM via Canvas.

Guidelines:

- The project must follow the requirements and design criteria provided in the project instructions and applicable provisions of ACI 318.
- Students are expected to clearly document design assumptions, calculations, and engineering decisions.
- Submitted work should be organized, legible, and presented in a professional engineering format.
- All calculations and design decisions must be supported by appropriate equations, code provisions, or other course-approved references.
- Computer tools may be used when specifically permitted, but students remain responsible for verifying all results and demonstrating an understanding of the underlying engineering principles.
- Use of artificial intelligence (AI) tools must follow the AI policy for this course and any project-specific instructions.
- Late submissions will be handled according to the course late-work policy (highlighted in the assignment section above) unless prior arrangements have been approved by the instructor.
- Additional project-specific expectations, including submission format and grading criteria, will be provided with the project assignment.

RECORDINGS

Class sessions may be recorded by the instructor for the use of students enrolled in this course. Recordings that include personally identifiable information or other sensitive content protected under FERPA will not be shared with anyone outside the course without the consent of all relevant students. Recordings are intended only for educational use by enrolled students and must not be distributed or shared outside the course without explicit permission.

Academic Misconduct

Plagiarism on homework and cheating on exams are considered academic misconduct and will not be tolerated. Please refer to the University of Texas at Tyler Undergraduate Catalog and the Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8) for university policies on academic integrity, cheating, and plagiarism. Ignorance of these policies does not excuse violations. All incidents of academic dishonesty will be addressed according to university rules.

Collection of Student Work

During the semester, selected student work (best, average, and below-average examples) may be collected for inclusion in ABET outcomes notebooks. This process will involve making a copy of your work while returning the original graded assignment to you. Your individual performance level will not be disclosed when samples are used.

CALCULATOR POLICY

Only NCEES-approved calculators are permitted during examinations. Students using a non-approved calculator will be required to put it away. Students are responsible for bringing an approved calculator to each examination.

Approved calculators include the following for 2026 (see the official NCEES website for the current complete list):

- Hewlett Packard: HP 33s, HP 35s
- Casio: All FX-115 models
- Casio: All FX-991 models
- Texas Instruments: All TI-30X and TI-36X models

It is the student's responsibility to confirm that their calculator is approved. If you are unsure, check with the instructor prior to the exam. Calculators may be inspected during an examination. No exception allowing the use of a non-NCEES-approved calculator will be made during an examination.

AI POLICY

UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

For this course: Category 2 - AI is permitted only for specific assignments or situations, and appropriate acknowledgment is required. This course has specific assignments where artificial intelligence (AI) tools, such as ChatGPT or Copilot, are permitted and encouraged. When AI use is permissible, it will be clearly stated in the assignment directions. AI is intended to support -not replace-your own engineering reasoning, calculations, and judgment.
For assignments that ask you to use AI as a checking or feedback tool, you are expected to first develop your own answer, solution, or reasoning independently. You may then use an AI tool to check your work, compare approaches, identify possible errors, or obtain feedback. When requested, you must submit or retain evidence of both your original work and your AI-assisted checking process.
Any use of AI must be disclosed. Your disclosure should identify the AI tool used, explain what you used it for, and briefly describe how the AI output influenced or changed your final work. You remain fully responsible for the accuracy of all calculations, code references, design decisions, and written explanations that you submit. AI output should be independently verified rather than accepted as authoritative.
AI tools may not be used during quizzes or examinations. Using AI in a manner prohibited by an assignment, failing to disclose AI use, or submitting AI-generated work as your own independent work may be treated as a violation of UT Tyler academic integrity requirements.

Suggested AI disclosure format: AI tool used; purpose of use; how the output was checked or verified; and how it affected the final submission.

SYLLABUS DISCLAIMER

This syllabus serves as a formal statement of intent regarding how the course will be conducted during the semester. It provides an outline of the topics to be covered, the requirements you are expected to fulfill, and the timeline necessary for successful completion of the course. The syllabus is designed to ensure fairness and to prevent arbitrary or untimely changes to course expectations.

However, the instructor reserves the right to make modifications to the syllabus when necessary. Any such changes will be communicated in advance and reflected in the updated syllabus posted on Canvas. Unforeseen circumstances may require adjustments to course content, requirements, or scheduling. In such cases, every effort will be made to provide timely updates and clear guidance.

PURCHASING INSTRUCTIONS FOR ACI 318 MANUALS

1. Register for a free student membership with ACI using your UT Tyler email address.
2. Once you receive your membership number (this may take a few days), purchase the ACI 318-19(22) manual at the discounted member price.
3. Be sure to select Inch-Pound (IN-LB) Units and a printed document if a printed manual is required for examinations.

Use the current ACI student membership and publication pages for active links and pricing.

Note: You do not need to purchase the ACI 318-19(22) if you already have ACI 318-19 or some other later versions.

TENTATIVE COURSE SCHEDULE

Week	Dates	Content
Week 1	Aug. 25 & 27	**Introduction, Design Philosophy, and RC Materials**
Week 2	Sept. 1 & 3	**Behavior of Reinforced Concrete Members**
Week 3	Sept. 8 & 10	**Flexural Analysis of Reinforced Concrete Beams**
Week 4	Sept. 15 & 17	**Flexural Design of Rectangular Beams**
Week 5	Sept. 22 & 24	**T-Beams and Flexural Design Applications**
Week 6	Sept. 29 & Oct. 1	**Serviceability, Durability, High-Strength Materials, and Design Review**
Week 7	Oct. 6 & 8	**Review Session (Oct. 6); Midterm Examination (Oct. 8)**
Week 8	Oct. 13 & 15	**Shear Design of Reinforced Concrete Beams**
Week 9	Oct. 20 & 22	**Development Length, Reinforcement Detailing, and Connections**
Week 10	Oct. 27 & 29	**One-Way Slabs and Introduction to Two-Way Slabs**
Week 11	Nov. 3 & 5	**Reinforced Concrete Columns: Behavior and Analysis**
Week 12	Nov. 10 & 12	**Column Design and Detailing**
Week 13	Nov. 17 & 19	**Spread Footings and Foundation Design,**
Week 14	Nov. 24 & 26	**Thanksgiving Holiday — No Class**
Week 15	Dec. 1 & 3	**Composite Construction; Introduction to Precast/Prestressed Concrete; Comprehensive RC Design Integration; Design Project Due (Dec 3, 12 PM)**
Final Exam	Dec. 8	**Comprehensive Final Examination 8:00–10:00 a.m.**

The schedule is tentative and may be adjusted as needed. Any changes will be communicated through Canvas.