UCONN
UNIVERSITY OF CONNECTICUT

Design of Reinforced Concrete Structures
School of Engineering

Syllabus – Fall 2022

Excluding materials for purchase, syllabus information may be subject to change. The most up-to-date syllabus is located within the course in HuskyCT.

Course and Instructor Information

Course Title: Design of Reinforced Concrete Structures
Credits: 4
Format: In person
Prerequisites: CE 3610, Basic Structural Analysis, Enrollment in the School of Engineering
Professor: Kay Wille, Ph.D., Associate Professor

Email:	kay.wille@uconn.edu
Office location:	CAST 324
Virtual office:	https://uconn-cmr.webex.com/meet/kaw10012
Telephone:	860-486-2074
Office Hours:	Mo 3pm to 4pm (virtual or in person) and by appointment

Graduate TAs:
Indrani Chattopadhyay: indrani.chattopadhyay@uconn.edu – https://uconn-cmr.webex.com/meet/inc21001
Bijaya Rai: bijaya.rai@uconn.edu – https://uconn-cmr.webex.com/meet/blr18007

Course Materials

Suggested Materials:
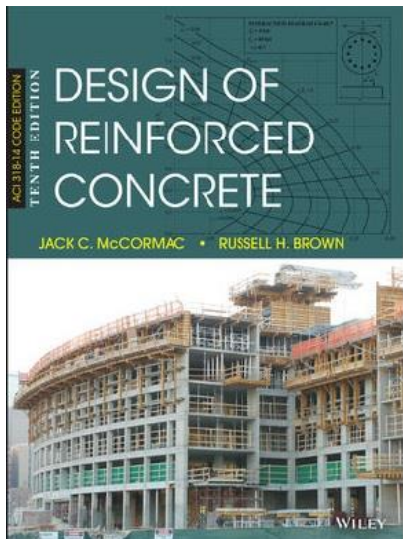
Text book:

Design of Reinforced Concrete, 10th Edition, Jack C. McCormac, Russell H. Brown, Wiley, 2015

Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary

Textbooks are available for purchase through the UConn Bookstore (or use the Purchase Textbooks tool in HuskyCT). Textbooks can be shipped (fees apply).

Additional course readings and media are available within HuskyCT, through either an Internet link or Library Resources.

Description:
The course presents the basic principles and design methodologies of reinforced concrete elements, such as beams, slabs, columns, and footings. This includes loads; design philosophies, and current design codes to analyze and design reinforced concrete beams, slabs, columns, and footings for flexure, shear and axial loads. It also includes serviceability considerations, applications to buildings and a group design project.

Lectures: Where? – UTEB 175 in person

When? – Mo, Wed, Fr from 8:00 – 8:50 am

Labs: Where? – CAST 117

When? – Thu –8:00-9:15am, 9:30-10:45am

The lab is an integral part of the course where you will learn and practice using the design software StructurePoint.

Beside the lab sessions, assignments and step by step instructional videos will further support you to become familiar with the software.

Your assignments are to be submitted as pdf-file to a designated folder on HuskyCT on time.

Modules: The course is organized into 11 modules as it can be seen in the course outline. Each module consist of **lectures**, where the concepts are being introduced, explained and practiced with design problems, and **homeworks**, where the concepts are being practiced in more detail at home.

Delivery / Course Format:
The course will be offered in person. All learning materials will be provided on HuskyCT. This includes powerpoint slides, announcements, lab handouts, lab videos, and explanations to various assignments. Assignments include homeworks, course project report, course project presentations, midterm and final exams will be run through HuskyCT. **You can decide between taking the final exam and doing the course project in a group OR opting out of the final exam and completing the course project by yourself.**
The lab portion of this course emphasizes learning and using the design software StructurePoint. In person lab sessions, pre-recorded tutorials, short assignments, and lab office hours will ensure that you are able to learn this software.

Lecture Overview:

No. of Classes	Topic	Reading in McCormac	HW assignment
3	**Module 1:** Introduction Concrete and Reinforced Concrete	CH. 1	#1 due 09/09
3	**Module 2:** Flexural Analysis of Beams	CH. 2	#2 due 09/16
2	**Module 3:** Strength Analysis of Beams	CH. 3	#3 due 09/23
3	**Module 4:** Design of Rectangular Beams and One-way Slabs	CH. 4	#4 due 10/03
4	**Module 5:** Analysis & Design of T-Beams & Doubly RC Beams	CH. 5	#5 due 10/14
1	*Review* **Module 1-5:**	CH. 1-5	----
4	**Module 6:** Continuous RC Structures	CH. 14	#6 optional due 10/28
1	**Midterm Exam (tentatively 10/19/2022)**	----	----
2	**Module 7:** Serviceability	CH. 6	#7 due 11/04

2	**Module 8:** Bond, Development lengths, and Splices	CH. 7	#8 due 11/11
3	**Module 9:** Shear and Diagonal Tension	CH. 8	#9 due 11/18
4	**Module 10:** Introduction to & Design of Short Columns	CH. 9 / 10	#10 due 11/30
4	**Module 11:** Footing	CH. 12	#11 due 12/07
	Thanksgiving Break (11/20 – 11/26/2022)	----	----
4	**Review Sessions / Course Project Presentation**	----	----
	Final Exam (tentatively 12/12/2022 – 12/18/2022)	----	----

Lab Overview:

Lab session	Topic	Instructional Video	Lab assignment
1 Thu: 09/01	**Module 1: Introduction Software (no in-person lab)** a) Watch tutorial videos from StructurePoint's website	n.a.	n.a.
2 Thu: 09/08	**Module 2: Introduction Beams** a) Introduction to SPBeam b) Simply Supported beam: Statics – Demonstration (hand calculation + SPBeam)	Available 09/09	Module 2 Due: 09/15, 11:00 PM
3 Thu: 09/15	**Module 3: Strength Analysis of Beams** a) Simply Supported Beam with Overhang: Statics + Analysis (M_n) – Demonstration (hand calc. + SPBeam)	Available 09/16	Module 3 Due: 09/22, 11:00 PM
4a Thu: 09/22	**Module 4: Design of Continuous Beam** a) Continuous Beam - Investigate: Statics + Analysis (M_n) – Demonstration (SPBeam) – Live Load Pattern	Available 09/23	Module 4a Due: 09/29, 11:00 PM
4b Thu: 09/29	**Module 4: Design of Continuous Beam** a) Continuous Beam - Design: Analysis $(M_{u+}$ & $M_{u-})$ – Demonstration (SPBeam) b) Demonstration of Input and Output files incl. graphical input	Available 09/30	Module 4b Due: 10/06, 11:00 PM
5 Thu: 10/06	**Module 5: T-Beams** a) Analysis of T-Beam: Investigate (M_{u+}) – Demonstration (SPBeam)	Available 10/07	Module 5 Due: 10/13, 11:00 PM
6 Thu: 10/13	**Module 6: Continuous Beam** a) One-way Slab and Beam Design – Demonstration (SPBeam or SPSlab)	Available 10/14	Module 6 Due: 10/27, 11:00 PM
Thu: 10/20	**No lab this week**		

7 Thu: 10/27	**Module 7: Serviceability (Deflection)** a) Beam Deflection: Investigate (Instantaneous + Long-term Deflection) – Demonstration (SPBeam)	Available 10/28	Module 7 Due: 11/10, 11:00 PM
Thu: 10/03	**No lab this week**		
Thu: 11/10	**Module 9: Beam Design – Bending and Shear** Beam Design – Flexure and Shear: Design of flexural (incl. compression rebar) + shear reinforcement – Demonstration (SPBeam)	Available 11/11	Module 9 Due: 11/17, 11:00 PM
10 Thu: 11/17	**Module 10: Column Design** a) SPColumn Overview b) Column Design – Demonstration (SPColumn)	Available 11/18	Module 10 Due: 12/01, 11:00 PM
Thu: 11/24	**No lab this week – Thanksgiving Break**		
11 Thu: 12/01	**Module 11: Footing Design** a) SPMats Overview b) Design of footing – Demonstration	Available 12/02	Module 11 Due: 12/08, 11:00 PM

Course Outcomes

Students completing this course will be able to do the following:

- Explain the principles of reinforced concrete
- Assess proper dead, live and other structural loads
- Design reinforced concrete beams, slabs, columns, and footings for flexure, shear, and axial loads using ACI standard (ACI 318-14)
- Design reinforced concrete elements using the design software StructurePoint
- Connect principles of reinforced concrete in a course design project
- Present parts of the course project results

ABET EAC Student Outcomes:
- Apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline: A project will be assigned in which the students work in groups to design a multi-story building. Each student will receive a grade on his/her portion as well as a group grade on the overall project.
- Recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge: This course employs the latest design codes and is constantly updated. This criterion will be assessed through questions on quizzes in class, online assessments using a pool of multiple choice questions, midterm exam and the final exam covering each of the specific course outcomes listed above.

Course Expectations

The students will:
- review important standards, policies and resources, including the Student Code (Academic Integrity, Resources on Avoiding Cheating and Plagiarism), Copyrighted Materials, Credit Hours and Workload, Netiquette and Communication, Adding or Dropping a Course, Academic Calendar, Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships, Sexual Assault Reporting Policy
- get familiar with the course's HuskyCT website

- work on assigned homework and lab problems and submit them when due

The instructor will:
- introduce himself and the TA team to the students using HuskyCT and in person the first day in class
- provide instructional videos, presentation slides and solutions to assigned problems
- assign homework problems and lab exercises
- oversee homework and lab report grading / critically and fairly grade exams
- be available to answer student's questions inside and outside class
- conduct meetings (as needed) to answer questions
- provide feedback on student's performance in a timely fashion, by assigning numerical grades via HuskyCT and a narrative indicating how is the student progressing overall on a per topical unit basis
- conduct extra review sessions for students that are facing challenges in the course

<div align="center">Course Requirements and Grading</div>

Grading: Tentative Distribution of points:

Assignment	No	Points Track A	Points Track B
iClicker	20+ (85/15)	5	5
Homework	11	20	20
Lab assignments	11	10	10
Midterm Exam	1	**20**	**25**
Course Project	1	**20 (group)**	**40 (indiv)**
Final Exam	1	**25**	**0**

When to decide for Track A or B? → After midterm exam

iClicker: During the lecture questions will be asked. The iClicker will be used to answer. Please visit https://www.iclicker.com/ for creating an account if you do not have one yet.

Homework: Usually, homework will be assigned during class and will be due one week later. These homework assignments represent a large portion of your final grade for the class. *They must be neat, solutions clearly presented, figures drawn with straight edges, and scanned to a pdf file in good quality.* Your solutions should be presented in a format similar to how you would present an engineering design in practice. For example, the problem should be clearly stated, the appropriate code requirements cited, and the basis for selection from different design alternatives described. Finally, high quality sketches should accompany your solutions. Collaboration on homework is acceptable. This does not mean that you divide up the assigned problems and copy one-another's solution. Part of learning is the thought process necessary to decide how to approach the solution of a homework problem. You should do this yourself without assistance from anyone before any collaboration.

Homework must be submitted as pdf-file to a designated folder on HuskyCT. Late homework will receive a 10% penalty per calendar day.

Lab assignments: During the course several lab assignments need to be submitted based on the use of the software StructurePoint.

Course Projects: A course project is assigned to several teams of students (up to 4-5 in each group) in the first half of the semester. The project requires designing a multi-story building by using the design principles learned in class and during homework. It is required to use hand calculation and to compare the results with the results obtained by the design software, which is weekly taught in the lab sessions. The results will be submitted as a group report and part of the project will be presented in class. Student evaluation sheets will provide you the opportunity to evaluate your and your group members' contribution to the project.

Exams: There will be a midterm exam and a final exam. Exam problems will test your ability to synthesize and apply the principles you are expected to learn in this class. Both exams will be administered through HuskyCT. They will consist of multiple choice questions and small calculation problems.

Grading Scale:

Grade	Letter Grade	GPA	Grade	Letter Grade	GPA
93 - 100	A	4.0	73 – 76.9	C	2.0
90 - 92.9	A-	3.7	70 – 72.9	C-	1.7
87 - 89.9	B+	3.3	67 – 69.9	D+	1.3
83 – 86.9	B	3.0	63 – 66.9	D	1.0
80 – 82.9	B-	2.7	60 – 62.9	D-	0.7
77 – 79.9	C+	2.3	< 60	F	0.0

This grade scale is guaranteed. The instructor reserves the right to bump students **up** to the next-higher grade when deemed appropriate (as determined by the instructor). PLEASE NOTE: There will be no extra assignments to improve students' perceived grade deficiencies.

The instructor will make every effort to provide feedback and grades within a week from the exam or lab report submission. To keep track of your performance in the course, refer to My Grades in HuskyCT.

Class attendance policy:
Regular and punctual attendance at all class sessions is the responsibility of each student. In the event of any absence, it is the responsibility of the student to obtain the notes for that class as well as any handout materials or information that may have been announced. All materials will be made available on HuskyCT.

Classroom expectations:
You are expected to arrive before the class is scheduled to begin. If you have a cell phone with you, silence the ringer before coming to class. Other electronic devices, such as tablets or laptops, are allowed during the lecture as long as no other students get distracted and find it more difficult to follow the lecture.

Code of Conduct and Collaboration Policy:
Students who come to the class must respect other students' right to learn. No distracting behavior will be tolerated. Students are encouraged to discuss homework and lab assignments in the interest of gaining better understanding of the material. However, direct copying is discouraged and may result in point deductions for all involved parties. Students are expected to collaborate with their group members or other groups to complete the course project; they will evaluate each other anonymously in order to ensure that proper credit is given to all members of the group. Collaborating on exams will result in a ZERO exam grade for all parties involved.

Final Exam:
Final exam week for fall 2022 takes place from **Monday, December 12th through Sunday, December 18th**. Students are required to be available for their exam during the stated time. If you have a conflict with this time you must visit the Office of Student Services and Advocacy to discuss the possibility of rescheduling this exam.

Please note that vacations, previously purchased tickets or reservations, graduations, social events, misreading the exam schedule and over-sleeping are not viable excuses for missing a final exam. If you think that your situation warrants permission to reschedule, please contact the Office of Student Services and Advocacy with any questions. Thank you in advance for your cooperation.

Due Dates and Late Policy:
All course due dates will be provided in HuskyCT. Deadlines are based on Eastern Time; if you are in a different time zone, please adjust your submittal times accordingly. *The instructor reserves the right to change dates accordingly as the semester progresses. All changes will be communicated in an appropriate manner.*

Feedback and Grades:
I will make every effort to provide feedback and grades in a week after homeworks and exams have been submitted. To keep track of your performance in the course, refer to My Grades in HuskyCT.

Weekly Time Commitment:
You should expect to dedicate **12 hours a week** to this course. This expectation is based on the various course activities, assignments, and assessments and the University of Connecticut's policy regarding credit hours. More information related to hours per week per credit can be accessed at the Online Student website.

Student Authentication and Verification:
The University of Connecticut is required to verify the identity of students who participate in online courses and to establish that students who register in an online course are the same students who participate in, complete the course activities and assessments, and receive academic credit. Verification and authentication of student identity in this course will include:

1. Secure access to the learning management system using your unique UConn NetID and password.
2. For the midterm and final exam you will use Respondus Lockdown Browser with Monitor where you will show your ID before as part of the recorded assessment
More information can be found at Guidelines for the Authentication of Students in Online Courses

Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies. In addition, there are numerous resources available to help you succeed in your academic work. Review these important standards, policies and resources, which include:

- The Student Code
  - Academic Integrity
  - Resources on Avoiding Cheating and Plagiarism
- Copyrighted Materials
- Credit Hours and Workload
- Netiquette and Communication
- Adding or Dropping a Course
- Academic Calendar
- Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships
- Sexual Assault Reporting Policy

Diversity, Equity and Inclusion Statement

My goal is to create an inclusive environment where all students can thrive while learning the concepts and approaches taken in environmental engineering. This includes providing a variety of resources for different learning styles and levels of preparation, providing opportunities for choice in what you learn, and providing opportunities to demonstrate your learning in a variety of modes. It is also reflected in the way in which I structure the classroom activities, assignments and the topics that we cover.

The INCLUDE program is a NSF-funded neurodiversity initiative that aspires to create an inclusive learning environment in which all students can thrive. Emphasis is given to providing a strengths-based approach to education that encourages students to identify, develop, and leverage their unique abilities to address complex engineering problems. This course was designed to address the diverse thinking and learning styles that neurodiverse and neurotypical students possess. Several pedagogical innovations will be implemented in this course including, but not limited to active learning, alternative examination modalities, project-based learning.

Both as a student and later as a professional engineer, considering diversity, equity and inclusion is essential to being an effective engineer with the goal of solving problems for all members of the community in which you are working.

I continuously learn about pedagogy and develop course materials in order to be a more effective instructor and any feedback on materials, resources or approaches that could help improve your learning and retention of the course topics is always welcome!

Accessibility Statement

The University of Connecticut is committed to protecting the rights of individuals with disabilities and assuring that the learning environment is accessible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. Students who require

accommodations should contact the Center for Students with Disabilities, Wilbur Cross Building Room 204, (860) 486-2020 or http://csd.uconn.edu/.

Blackboard measures and evaluates accessibility using two sets of standards: the WCAG 2.0 standards issued by the World Wide Web Consortium (W3C) and Section 508 of the Rehabilitation Act issued in the United States federal government." (Retrieved March 24, 2013 from Blackboard's website)

The software/technical requirements for this course include:

- HuskyCT/Blackboard (HuskyCT/ Blackboard Accessibility Statement, HuskyCT/ Blackboard Privacy Policy)
- Adobe Acrobat Reader (Adobe Reader Accessibility Statement, Adobe Reader Privacy Policy)
- Google Apps (Google Apps Accessibility, Google for Education Privacy Policy)
- Microsoft Office (free to UConn students through uconn.onthehub.com) (Microsoft Accessibility Statement, Microsoft Privacy Statement)
- Dedicated access to high-speed internet with a minimum speed of 1.5 Mbps (4 Mbps or higher is recommended).
- WebCam

For information on managing your privacy at the University of Connecticut, visit the University's Privacy page.

NOTE: This course has NOT been designed for use with mobile devices

Technical and Academic Help provides a guide to technical and academic assistance.

This course is completely facilitated online using the learning management platform, HuskyCT. If you have difficulty accessing HuskyCT, you have access to the in person/live person support options available during regular business hours through the Help Center. You also have 24x7 Course Support including access to live chat, phone, and support documents.

Resources for Students Experiencing Distress

The University of Connecticut is committed to supporting students in their mental health, their psychological and social well-being, and their connection to their academic experience and overall wellness. The university believes that academic, personal, and professional development can flourish only when each member of our community is assured equitable access to mental health services. The university aims to make access to mental health attainable while fostering a community reflecting equity and diversity and understands that good mental health may lead to personal and professional growth, greater self-awareness, increased social engagement, enhanced academic success, and campus and community involvement.

Students who feel they may benefit from speaking with a mental health professional can find support and resources through the **Student Health and Wellness-Mental Health** (SHaW-MH) office. Through SHaW-MH, students can make an appointment with a mental health professional and engage in confidential conversations or seek recommendations or referrals for any mental health or psychological concern.

Mental health services are included as part of the university's student health insurance plan and also partially funded through university fees. If you do not have UConn's student health insurance plan, most major insurance plans are also accepted. Students can visit the **Student Health and Wellness-Mental Health located in Storrs on the main campus in the Arjona Building, 4th Floor,** or contact the office at **(860) 486-4705, or https://studenthealth.uconn.edu/** for services or questions**.**

Accommodations for Illness or Extended Absences

Please stay home if you are feeling ill and please go home if you are in class and start to feel ill. If illness prevents you from attending class, it is your responsibility to notify your instructor as soon as possible. You do not need to disclose the nature of your illness, however, you will need to work with your instructor to determine how you will complete coursework during your absence.

If life circumstances are affecting your ability to focus on courses and your UConn experience, students can email the Dean of Students at dos@uconn.edu to request support. Regional campus students should email the Student Services staff at their home campus to request support and faculty notification.

Minimum Technical Skills

To be successful in this course, you will need the following technical skills:

- Use electronic mail with attachments.
- Save files in commonly used word processing program formats.
- Copy and paste text, graphics or hyperlinks.
- Work within two or more browser windows simultaneously.
- Open and access PDF files.

University students are expected to demonstrate competency in Computer Technology. Explore the Computer Technology Competencies page for more information.

Evaluation of the Course

Students will be provided an opportunity to evaluate instruction in this course using the University's standard procedures, which are administered by the Office of Institutional Research and Effectiveness (OIRE).

Additional informal formative surveys may also be administered within the course as an optional evaluation tool.