

**M. E. Rinker, Sr. School of Construction Management
University of Florida
Semester Course Outline**

BCN 3431C - Structures

Spring 2024

3 credits

Instructor

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Prerequisites BCN 2405, MAC 2311, PHY 2053, and PHY 2053L

Method:

Description To familiarize the student with the material properties, design procedures, and code requirements for steel and concrete buildings.

Required Texts

Reinforced Concrete Design, George, F. Limbrunner and Abi O. Aghayere, Ninth Edition, 2018

Structural Steel Design: A Practice Oriented Approach by Abi O. Aghayere and Jason Vigil, Second Edition, 2014, Prentice Hall.

References

Structural Steel Design, William T. Segui, Prentice Hall

‘Applied Statics and Strength of Materials’ by Spiegel and Limbrunner.

Concrete Structures, Setareh and Darvis, 2007, Prentice Hall

‘Manual of Steel Construction’, AISC, Thirteenth Edition

Student Learning Outcomes

Upon completion of the course students will demonstrate their ability to:

- 1) Review ASTM standards for structural elements and recognize use of various structural steel shapes, metal decks, open-web bar joists, high strength steel bolts, welds and reinforcing steel. (PL 1, ACCE SLO 7, 8)
- 2) Use sections of Florida Building Code related to structural design and calculate code-required design loads; be aware of the existence of other local and national building codes. Understand different design methodologies such as allowable stress design and load and resistance factor design. (PL 1, ACCE SLO 8, 19).
- 3) Recognize different structural systems and their assembling methods, including pre-stressed concrete, precast concrete, cast-in place concrete, T-beams, doubly reinforced beams. (PL 1, ACCE SLO 7).
- 4) Analyze and design simple structural elements (beams, columns, trusses) made of steel and concrete for bending, shear, deflection, compression and tension as applicable, as well as connections between such elements using AISC manual and ACI codes. (PL 1, ACCE SLO 19).
- 5) Read, understand, and use structural drawings, shop drawings, and erection and placing drawings as well as specifications for structural members. (PL 1, ACCE SLO 7, 8, 15)

- 6) Understand fundamentals of structural design and be creative in proposing solutions to daily problems encountered in a construction project. (PL 1, ACCE SLO 8, 19).

Attendance and Discipline

Students are not allowed to use laptops, iPods or other electronic devices at all. All cell phones must be turned off during classes. The attendance is compulsory. Students are not allowed to attend the section in which they are not enrolled. Students who are more than five minutes late will not be allowed to attend class. Attendance for field trips will carry 15 points. Attendance for lectures will carry 35 points and will be based on the attendance record for the days instructor chooses to take attendance.

Student Responsibilities

As the course progresses, the course syllabus, text book requirements, grading policies may be modified by the instructor. Students are therefore required to pay special attention to announcements in this regard. Attend all classes and send-in homework when due. Be aware of all the announcements or changes in the course policies or coverage made by the instructor. Read the text assignment before the class and come prepared with questions. Work extra problems to understand each topic. Instructor will ask a student to leave the classroom if he is talking or engaging in other disruptive behavior in class. Food or drinks are not allowed in classes. Honor Code will be strictly enforced. Seek timely help if not making satisfactory progress. Students needing accommodations for learning differences and other physical conditions need authorization from appropriate UF offices and submit the paperwork to instructor at-least one-week prior to exams otherwise no accommodation will be provided. Tell instructor if you withdraw from this course or end your activity in this course. Be aware of the Honor System of University of Florida. All students in this course are subject to the requirements of the University of Florida's Honor Code. *We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*

Online Course Evaluation "Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semesters, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

Grading	Points
Pop Quizzes (15-30 minutes) (Best 8 to 12)	500
Field Trips Attendance	50
Homework	100
Total	650

Twelve to sixteen unannounced pop quizzes, will be given during the semester. Quiz topics and syllabus will be announced one week in advance. Students should be ready to take a quiz on any lecture or lab. Day. Students are advised to adhere to highest norms of honesty as spelled out in the student honor code during quizzes. Students should also avoid any action that may even lead to perception of cheating or dishonesty. **Therefore, talking, exchanging books or notes, sitting close to another student during quizzes, wearing sunglasses or caps is strictly prohibited.** Instructor may assign seating to a specific student before or during a quiz. This is a new grading policy so changes to this policy may be made during as well as at the end of the semester. Students will have to bring text-book, calculators, laptop computers with extra battery to all classes to take pop quizzes.

All quizzes are open books, open notes and have equal weight. Three/Four lowest quiz grades will be dropped while calculating final grade because of low performance or absences due to medical reasons, school-related activities, family issues, emergencies, work-related issues and other unforeseen circumstances. **No make-up quiz will be given.** If a student expecting to miss more than four quizzes for valid school related or medical reasons should e-mail doctors note or other documents for failing to take a quiz to class TA within a week of quiz. To complete the course syllabus in time, quiz solutions will be posted on the Internet. All matters about change of quiz grade should be settled within a week after it is given. Depending on raw scores instructor may choose to curve any or all quizzes.

All absences in quizzes will incur a zero. If a student were to miss more than four quizzes for **valid and well documented reasons, for example, taking part in school related activities or medical conditions etc.** talk to instructor for making alternate arrangements

Grading Scale

0-389 E; 390-411 D-; 412-431 D; 432-454 D+; 455-475 C-; 476-496 C;
497-519 C+; 520-540 B-; 541-561 B; 562-584 B+; 585-606 A-; 607-650 A.

ASSESSMENT METHODS

Assessment	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5	SLO 6	SLO 7
Quizzes 1-3		X		X			
Quizzes 4-6			X	X	X		
Quizzes 7-9	X		X			X	
Quizzes 10-12	X				X		
Quizzes 13-16		X				X	X

Assessment	Target
All Quizzes	At least 80% receive a C- or better
Homework	At least 70% receive C- or better
Field Trips	At least 90% receive A or better

Scanner

Documents can be scanned in all on-campus computer labs. Alternately, students may find it advisable to buy an 8.5 in. x 11in. sheet scanner or a flat-bed scanner. The prices have dropped significantly and many scanners for scanning 8.5in. X 11in. sheets are available between \$65 -\$80.

Homework

- **Assigned homework should be uploaded to the E-learning website by 5PM every Tuesday.**
- In case the server is not working an e-mail with attachment (in pdf file format) TA can be sent.
- If TA's e-mail is not working then you may send the HW to shanker@ufl.edu
- If you submit HW by e-mail, the subject line should be 'BCN 3431C, HW No.____, Your Name_____, and time of Thursdays' lab class.

We will try to post the HW solutions before 9:00AM on Wednesday. Students are required to check their HW and make any corrections themselves. The TA will assign HW grade to all submissions within a week. Because of this arrangement, late homework will not be accepted under any circumstances. Problems should be worked on the engineering paper with 0.5-mm pencil before scanning the HW as a pdf file. Please use not more than 300 dpi resolution to make small files. All sketches should be neatly drawn using a ruler. All answers should be underlined.

The teaching assistant appointed by the school for this course would be in-charge of the homework grade part of this course. As many students are enrolled in this class, students should realize the potential of errors or omissions on part of teaching assistant and resolve it directly with him by e-mail. Homework grade may be assigned based on overall attempt or detailed checking, therefore, full points on any homework does not imply that solution is correct. Students are responsible for reviewing correct homework solutions, exams and homework grades that are posted on the Internet. Late HW will not be accepted in any circumstance.

BCN 3431 Course Outline

Week	Topics and Coverage	Reading Assignments
1.	Introduction	Review of Statics and Strength of Materials, Building Loads Ch1
2.	Reinforced Beams and Slabs. Design and Details	Concrete 2-1 thru 2-17, Precast Concrete handouts, videos
3.	Design and Details for T-beams Doubly Reinforced Beams	3-1 thru 3-9, PPTs
4.	Shear Design, Concrete Construction Rebar Shop Drawings	4-1, 4-4, PPTs Handouts
5.	Square and Circular Columns Design and Details	9-1 thru 9-10
6.	Wall and Column Footings: Design and Details	10-1 thru 10-5
7.	Pre-stressed Concrete and Concrete Masonry	PPTs, Handouts
8.	Loads, Codes: FBC, IBC, Design, Specifications Steel	1.1-1.6

	Concepts in Steel Design	2.1-2.3, 2.5, 2-6
9.	Beams Introduction, Bending Stress, Design for Bending, Deflection, Camber	5.2-5.3 Steel Manual, 5.9, 5.10
10.	Open Web Steel Joists Column Analysis and Design	5.12 4.3, 4.4
11.	Column Analysis and Design, Effective Lengths, Built-up Column	4.3, 4.4 4.5, 4.7
12.	Bolted Connections and Details Bearing Strength and Spacing	7.1, 7.2 7.3, 7.5, 7.6, 7.7
13.	Steel Shop Drawings	Handouts
14.	Welded Connections	7.10, 7.11

Assignments will also include reading shop drawings, watching videos, photos and CAD details and review of online media from industry sources.