

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

**BCN 2405C – Construction Mechanics    Fall 2020**

**4 Credits**

**Instructor:**     Dr. Aladdin Alwisy, RNK 311, Rinker Hall  
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**Prerequisites:**    MAC 3233, PHY 2004, and PHY 2004L

**Description:**     The course provides a general overview of structural behavior of loads resisting members in buildings. Properties of structural materials. Primarily for Building Construction majors.

**Objectives:**     To study forces, materials and their strengths (construction focused), topics shall include analysis of structural systems: beams, columns, frames, trusses. Students will also learn axial stress, strain, properties of materials, beam analysis, shear and moment diagrams, bending and shearing stress, deflection and design of typical building beams.

**Course  
Learning  
Outcomes**

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

1. Understand various types of measurement systems for force, area, length , and scalar and vector quantities for construction materials. ACCE SLO 19
2. Understand various force systems, g., concurrent, non-concurrent and parallel force systems and equilibrium to explain forces in structures and behavior of construction materials. ACCE SLO 19
3. Apply the concepts of structural mechanics to understand beam reactions, bending, shear, deflection, compression and tension, as applicable, in beams, columns, trusses, walls and ACCE SLO 19
4. Quantify and analyze the internal and external forces acting within and upon a structural component under various anticipated loading ACCE SLO 19
5. Understand effects of moments of inertia, sectional modulus, radius of gyration and modulus of elasticity on axial stress, strain, shear, moment, bending and shearing stresses, and deflection of various structural ACCE SLO 19
6. Understand basic principles of equilibrium and structural behavior of beams, frames, footings, trusses and ACCE SLO 19

7 Understand basic material properties of concrete, steel and timber for design and selection of beams, frames, trusses and columns. ACCE SLO 8.

**Required Text:** *Applied Statics and Strength of Materials, Sixth Edition, Limbrunner and Allaird, Pearson Prentice Hall, 2016.*

**Online Classes** *Zoom Meetings:*  
Mondays and Fridays (Period 3-4) 9:35 AM – 11:30 AM  
Wednesdays (Period 3) 9:35 AM – 10:25 AM  
<https://ufl.zoom.us/j/93166477573?pwd=UjJqZkxZUE9TM096T1hqR21Sck43QT09>  
Passcode: **BCN2405OC**

**Office Hours** *Zoom Meetings:*  
Mondays & Fridays (Period 7-8) 1:55 PM – 3:50 PM  
<https://ufl.zoom.us/j/92555683236?pwd=Z05jVWdFYTI5NkpJOGN3Q2E1VkIrdz09>  
Passcode: **BCN2405F20**

*By Appointment:*  
Email [aalwisy@ufl.edu](mailto:aalwisy@ufl.edu). Subject line should read *BCN 2405 APPOINTMENT REQUEST-<your name>*.

Provide a brief description of what you want to discuss. Also please suggest one or two alternate times for scheduling other student requests. I will send you an e-mail about the appointed time.

**TA:** *TBD*

**Attendance:** Attendance is mandatory. You have three unexcused absences. To have an absence excused, you need to bring proof of why it was unavoidable (doctors note, etc.)

**Quizzes:** *NO MAKEUP QUIZZES.* There will be Ten (10) in-term quizzes given during the semester. You will have about three days (from Friday after class till Sunday) in which to start your quiz, but after starting it you will only have 50 minutes to complete it. Quiz results must be discussed in person within 24 hours after the quiz has been taken. After 24 hours the grade is final. *Makeup exams will not be given.*

**Quiz Grades:** The lowest quiz grade 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.*

**Final Exam:** Final exam will be available online on **(TBD)**.

**Bonus points:** Bonus points opportunities will be given through the semester in class.

**Grade Makeup:** Final grades will be calculated as follows:

Top 15 of 18 Reading Quizzes @ 20 points (R-Quiz: At the beginning of each class)	300
Homework	300
Top 8 of 10 in-term quiz grades @ 50 points	400

**Grade Scale:** Divide the total points you earn by **1000 total possible points**. Grades will be given according to the following scale. **Decimal points will not be Rounded.**

Letter Grade	Numeric Grade
A	≥ 93
A-	≥ 90 AND < 93
B+	≥ 87 AND < 90
B	≥ 83 AND < 87
B-	≥ 80 AND < 83
C+	≥ 77 AND < 80
C	≥ 73 AND < 77
C-	≥ 70 AND < 73
D+	≥ 67 AND < 70
D	≥ 63 AND < 67
D-	≥ 60 AND < 63
F	<60

**Student Evaluations:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

**Accommodations:** Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

**Honor Code:** All students in this course are subject to the requirements of the University of Florida's Honor Code <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>. Cheating will not be tolerated. Although joint work on assignments may be acceptable in some cases, duplication of an assignment either manually or electronically will be dealt with as an act of academic dishonesty. "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."

**Counseling:** Contact information for the Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx> (Links to an external site.), 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies

**Reservations And Remedies:**

The instructor reserves the right to modify the course schedule, grade make-up, grade scale, modules, and any other aspect of the course as deemed fit throughout the term without notice. The updated Syllabus will be uploaded on the course's Canvas. For any questions, issues, or concerns about the course (assessment, policies, schedule, etc.), please contact the instructor to remedy them.

**Weekly Course Schedule:**

<b>Week/ Date</b>	<b>Activity</b>	<b>Topic/Assignment (Question/Subject)</b>	<b>Assigned Work Due</b>
<b>Week 1 Aug 31- Sep 4</b>	<b>Topic</b>	<b>Module 1: Introduction to Statics</b> BCN 2405 – Introduction Introduction to Statics (1-1 thru 1-6)	N/A
	<b>Assignment</b>	Assignment #1: Introduction to Statics	Sep 4-7
	<b>Quiz</b>	Quiz #1	Sep 4-7
<b>Week 2 <u>Sep 8-11</u></b>	<b>Topic</b>	<b>Module 2: Principles of Statics</b> Force, Units, Types Scalar and Vector Quantities	NA
	<b>R-Quiz</b>	R-Quiz #1: Chapter 2-1 thru 2-8	Sep 9
	<b>Assignment</b>	N/A	N/A
	<b>Quiz</b>	Quiz #2	Sep 11-13
<b>Week 3 Sep 14-18</b>	<b>Topic</b>	<b>Module 3: Resultants of Coplanar Force Systems</b> Resultant of Two Concurrent Forces Resultant of Three or More Forces Moment of Force & Varignon's Theorem Parallel Force Systems	N/A
	<b>R-Quiz</b>	R-Quiz #2: Chapter 3-1 thru 3-5	Sep 14
	<b>Topic</b>	Couples & Non-concurrent Force Systems	N/A
	<b>R-Quiz</b>	R-Quiz #3: Chapter 3-6 thru 3-7	Sep 16
	<b>Assignment</b>	Assignment #2: Principles of Statics & Resultants of Coplanar Force Systems	Sep 18-20
	<b>Quiz</b>	Quiz #3	Sep 18-20
<b>Week 4 Sep 21-25</b>	<b>Topic</b>	<b>Module 4: Equilibrium of Coplanar Force Systems</b> 4.1 Introduction 4.2 Conditions of Equilibrium 4.3 The Free-Body Diagram 4.4 Equilibrium of Concurrent Force Systems	N/A
	<b>R-Quiz</b>	R-Quiz #4: 4-1 thru 4-4	Sep 21
	<b>Topic</b>	4.5 Equilibrium of Parallel Force Systems 4.6 Equilibrium of Nonconcurrent Force Systems	N/A

<b>Week/ Date</b>	<b>Activity</b>	<b>Topic/Assignment (Question/Subject)</b>	<b>Assigned Work Due</b>
	<b>R-Quiz</b>	R-Quiz #5: 4-5 thru 4-6	Sep 23
	<b>Quiz</b>	Quiz #4	Sep 25-27
	<b>Assignment</b>	Assignment #3: Equilibrium of Coplanar Force Systems	Sep 25-27
<b>Week 5</b> <u>Sep 28 –</u> <u>Oct 1</u>	<b>Topic</b>	<b>Module 5: Analysis of Structures</b> 5.1 Introduction 5.2 Trusses 5.3 Forces in Members of Trusses 5.4 The Method of Joints	N/A
	<b>R-Quiz</b>	R-Quiz #6: 5-1 thru 5-4	Sep 28
	<b>Topic</b>	5.5 The Method of Sections 5.6 Analysis of Frames	N/A
	<b>R-Quiz</b>	R-Quiz #7: 5-5 thru 5-6	Sep 30
	<b>Assignment</b>	Assignment #4: Analysis of Structures 1/2	Oct 1-4
	<b>Quiz</b>	Quiz #5	Oct 1-4
<b>Week 6</b> <b>Oct 5 – 9</b>	<b>Topic</b>	<b>Analysis of Structures Problem Solving</b>	N/A
	<b>Topic</b>	<b>Module 6: Centroids and Centers of Gravity</b> 7.1 Introduction 7.2 Center of Gravity	N/A
	<b>R-Quiz</b>	R-Quiz #8: 7-1 thru 7-2	Oct 7
	<b>Topic</b>	7.3 Centroids and Centroidal Axes 7.4. Centroids and Centroidal Axes of Composite Areas	N/A
	<b>R-Quiz</b>	R-Quiz #9: 7-3 thru 7-4	Oct 9
	<b>Assignment</b>	Assignment #5: Analysis of Structures 2/2	Oct 9-11
	<b>Assignment</b>	Assignment #6: Centroids and Centers of Gravity	Oct 9-11
<b>Week 7</b> <b>Oct 12-16</b>	<b>Topic</b>	<b>Module 7: Area Moments of Inertia</b> 8.1 Introduction and Definitions 8.2 Moment of Inertia 8.3 The Transfer Formula 8.4 Moment of Inertia of Composite Areas	N/A
	<b>R-Quiz</b>	R-Quiz #10: 8-1 thru 8-4	Oct 12
	<b>Topic</b>	8.5 Radius of Gyration 8.6 Polar Moment of Inertia	N/A
	<b>R-Quiz</b>	R-Quiz #11: 8-5 thru 8-6	Oct 14
	<b>Assignment</b>	Assignment #7: Area Moments of Inertia	Oct 16-18
	<b>Quiz</b>	Quiz #6	Oct 16-18
<b>Week 8</b> <b>Oct 19 - 23</b>	<b>Topic</b>	<b>Module 8: Stresses and Strains</b> 9.1 Introduction	N/A

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
		9.2 Tensile and Compressive Stresses 9.3 Shear Stresses	
	<b>R-Quiz</b>	R-Quiz #12: 9-1 thru 9-3	Oct 19
	<b>Topic</b>	9.4 Tensile and Compressive Strain and Deformation 9.6 The Relation between Stress and Strain (Hooke's Law)	N/A
	<b>R-Quiz</b>	R-Quiz #13: 9-4, 9-6	Oct 21
	<b>Assignment</b>	Assignment #8: Stresses and Strains	Oct 23-15
	<b>Quiz</b>	Quiz #7	Oct 23-15
<b>Week 9</b> <b>Oct 26-30</b>	<b>Topic</b>	<b>Module 9: Shear and Bending Moment in Beams</b>  13.1 Types of Beams and Supports 13.2 Types of Loads on Beams 13.3 Beam Reactions 13.4 Shear Force and Bending Moment 13.5 Shear Diagrams	N/A
	<b>R-Quiz</b>	R-Quiz #14: 13-1 thru 13-15	Oct 26
	<b>Topic</b>	13.6 Moment Diagrams 13.7 Sections of Maximum Moment	N/A
	<b>R-Quiz</b>	R-Quiz #15: 13-6 thru 13-7	Oct 28
	<b>Assignment</b>	Assignment #9: Shear and Bending Moment in Beams	Oct 30-Nov1
	<b>Quiz</b>	Quiz #8	Oct 30-Nov1
<b>Week 10</b> <b>Nov 2 - 6</b>	<b>Topic</b>	<b>Module 10: Stresses in Beams</b>  14.1 Tensile and Compressive Stresses Due to Bending 14.2 The Flexure Formula 14.3 Computation of Bending Stresses 14.4 Shear Stresses 14.5 The General Shear Formula	N/A
	<b>R-Quiz</b>	R-Quiz #16: 14.1 thru 14.5	Nov 2
	<b>Topic</b>	14.6 Shear Stresses in Structural Members 14.7 Inelastic Bending of Beams	N/A
	<b>R-Quiz</b>	R-Quiz #17: 14.6 thru 14.7	Nov 4
	<b>Assignment</b>	Assignment #10: Stresses in Beams 1/2	Nov 6-8
	<b>Quiz</b>	Quiz #9	Nov 6-8
<b>Week 11</b> <b><u>Nov 9 - 13</u></b>	<b>Topic</b>	<b>Module 12: Properties of Materials</b>  10.1 The Tension Test 10.2 The Stress-Strain Diagram 10.3 Mechanical Properties of Materials 10.4 Engineering Materials: Metals 10.5 Engineering Materials: Nonmetals 10.6 Allowable Stresses and Calculated Stresses	N/A

<b>Week/ Date</b>	<b>Activity</b>	<b>Topic/Assignment (Question/Subject)</b>	<b>Assigned Work Due</b>
		10.7 Factor of Safety	
	<b>Assignment</b>	Assignment #11: Stresses in Beams 2/2	Nov 13-15
	<b>Quiz</b>	N/A	N/A
<b>Week 12 Nov 16-20</b>	<b>Topic</b>	<b>Module 11: Deflection of Beams</b> 15.4. The Formula Method	N/A
	<b>R-Quiz</b>	R-Quiz #18: 15.4	Nov 16
	<b>Assignment</b>	Assignment #12: Deflection of Beams	N/A
	<b>Quiz</b>	Quiz #10	Nov 20-22
<b>Week 13 <u>Nov 23-24</u></b>	<b>Topic</b>	Project Report	N/A
	<b>Assignment</b>	N/A	N/A
	<b>Quiz</b>	N/A	N/A
<b>Week 14 Nov 30 – Dec 4</b>	<b>Topic</b>	Project Report	Dec/06
	<b>Assignment</b>	N/A	N/A
	<b>Quiz</b>	N/A	N/A
<b>Week 15 <u>Dec 7 - 9</u></b>	<b>Topic</b>	Review	N/A
	<b>Assignment</b>	N/A	N/A
	<b>Quiz</b>	N/A	N/A
<b>Exam Week</b>	<b>Final Quiz</b>		TBD