

ENGR 3610	Structural Design
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Instructor:

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UGA Bulletin Course Description:

Deals with the relationship between loads and deflections which occur in structures as well as designing with wood and concrete.

<u>Offered</u>	<u>Credits</u>	<u>Level</u>	<u>Weekly Class Meeting Pattern</u>
Fall	3	Undergrad	2 - 75 minute lectures

Course Prerequisites:

ENGR 2140 - Strength of Materials - elements of stress analysis, resistance and design as applied to engineering materials and structures.

Course that Require this Course as a Prerequisite:

ENGR 4610 Design of Light Steel Structures

Textbook:

National Design Specification for Wood Construction (NDS) National Forest Products Association, Washington, D. C.

Additional materials will be provided from other tests and class notes provided by the instructor.

Method of Grading:

Average of Four Hourly Exams -	50%
Homework -	15%
Project -	10%
Final Exam -	25%

Grading Scale:

A	90 to 100	C-	69 to 70
A-	89 to 90	D	60 to 69
B+	86 to 89	F	0 to 60
B	80 to 86		
B-	79 to 80		
C+	76 to 79		
C	70 to 76		

Program Outcomes:

Engineering programs must demonstrate that their students attain the following outcomes:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Overall Course Contributions to Program Outcomes:

- | | |
|------------------|----------------|
| a..... extensive | g..... some |
| b..... | h..... some |
| c..... moderate | i |
| d.....some | j..... |
| e..... extensive | k.....moderate |
| f..... some | |

Course Learning Objectives Matrix

Course Learning Objectives Applicable Criterion	Course Assessment Methods	Extent of Coverage of Program Outcomes (ABET Criterion 3)	Program Outcomes
Upon successful completion of this course the student will be able to:			
1. Determine the vertical and horizontal deflections in beams and rigid frames using governing equations and energy techniques	A,B,C	a - xx e - xx	a. An ability to apply knowledge of mathematics, science, and engineering
2. Draw shear and moment diagrams for continuous beams and rigid frames.	A,B,C	a - xxx e - xxx	
3. Determine the internal forces and moments for indeterminate beams and rigid frames using equilibrium methods.	A,B,C,	a - xx e - xx	c. An ability to design a system, component or process to meet desired needs.
4. Calculate normal and shear stresses caused by various types of external forces.	A,B,C	a - xxx e - xxx	d. An ability to function on teams.
5. Design wood beams, columns, beam columns, wood nailed and bolted joints according to NDS Design Criteria	A,B,C	a - xx c - xx e - xx	e. An ability to design a system component, or process to meet desired needs.
6. Design concrete beams, spread footings wall footings and columns according to ACI Design Criteria	A,B,C	a - xx c - xx e - xx	f. Understanding of professional and ethical responsibility.
7. Use of structural design software (STAAD)	A	c - xx k - xx	g. An ability to communicate.
8. An ability to communicate effectively. of		g - x	h. Understanding the impact
9. An ability to function on teams		d - x	engineering solutions.
10. Understanding of professional and ethical responsibility.		f - x	k Ability to use modern <u>engineering tools.</u>

* Course Assessment Methods - A - Homework, B - Hourly Exams, C - Final Exams,

** Coverage of ABET Criterion 3 Program Outcomes: x - some, xx - moderate, xxx - extensive

Homework:

Homework assignments are due at the first of the class on the date assigned. Homework is expected to be neat and done with a straightedge. Each homework is initially worth 10 pts. Homework is the responsibility of each individual student and is not a group project.

Late Homework:

Homework turned in after class on the date due will be considered 1 day late and will have points deducted from it. Late homework will be dealt with in the following manner.

1 day late - 1 point deduction
2 days late - 2.5 points deduction
3 days late - 4.5 points deduction
4 days late - 7 points deduction
5 days late - 10 points deduction

Homework Turned in Between

Class and 5:00 p.m. on the day due
After 5:00 p.m. on the day due until 5:00 p.m. of the
After 5:00 p.m. of the next day until 5:00 p.m. two days after it is due

Tests:

Tests are open book, open note. This includes those materials which are the students such as class notes and homework assignments. Homework assignments and notes from your classmates, old tests, homework assignments and notes from previous semesters are not allowed.

Makeup Tests:

Makeup tests will be given to those people with valid excuses. Arrangement for a makeup test must be made prior to the exam. Anyone who misses a test without making arrangements for a makeup test will be automatically given a zero.

Office Hours:

Office hours are provided in order to answer your questions. Appointments can also be made to ensure that I am available during an appointed time. Appointments will be made with consideration to my schedule.

Attendance:

Attendance in class is expected. Those students who incur 5 absences (this total can be a combination of either excused or un-excused absences) will be withdrawn from class. Anyone entering class after attendance has been noted will be considered absent for that day.

Academic Honesty:

All students are responsible for maintaining the highest standards of honesty and integrity in every phase of their academic careers. The penalties for academic dishonesty are severe and ignorance is not an acceptable defense. The document for academic honesty may be found at the web site for The University of Georgia Office of Senior Vice President for Academic Affairs and Provost.

Engineering Professionalism Policy

The engineering profession is governed by a code of ethics that have developed alongside the rigors of the practice and its many contribution to society. Engineering students are responsible for maintaining the highest standards of professionalism and professional practice. Engineering

faculty at UGA expect students to act in a professional manner at all times.

Topics to be Presented:

1. Determinate Structural Systems
 - Free-Body Diagrams
 - Determinacy
 - Simple Determinate Structures
 - Plane Frame Analysis
 - Shear and Moments Diagrams
 - a) Beams
 - b) Frames
 - c) Three Hinged Frame
3. Structural Design Fundamentals
 - Material Behavior
 - Shear Stress and Strain
 - Loads
4. Computation of Deflections
 - Conjugate Beam Method
 - Principles of Virtual Work
 - Unit load method for Beams and Frames

******* TEST ONE *******

5. Indeterminate Structural Systems
 - a) Slope Deflection Techniques
 1. Continuous Beams
 2. Rigid Frames
 - b) Moment Distribution Techniques
 1. Continuous Beams
 2. Rigid Frames

******* TEST TWO *******

5. Light Timber Design
 - a) Beam Design
 - b) Column Design
 - c) Design of Tension Members
 - d) Beam Column Design
 - e) Connections - Bolts, Nails

Supplemental Material

******* TEST THREE *******

7. Reinforced Concrete Design
 - a) Reinforced concrete beams
 - b) Reinforced concrete foundations
 1. Spread footings
 2. Wall footings
 - c) Reinforced concrete columns
 - d) Cutting of bars

Those person in the bio-mechanics option will be working with Dr. Foutz during this part of the course learning about how to use a computer modeling tool.

******* TEST FOUR *******

8. Other Topics

Plywood design

Use of STAAD

******* FINAL EXAM *******

Project:

The project is 10% of your grade. The project topic will be determined at a later date.

Revision:

8-11-2000 - Fall Semester, 2000

8-13-2001 - Fall Semester, 2001

8-16-2002 - Fall Semester, 2002

8-15-2003 - Fall Semester, 2003

8-18-2004 - Fall Semester, 2004

8-15-2005 - Fall Semester, 2005

8-9-2006 - Fall Semester, 2006

8-1-2007 – Fall Semester, 2007