

Mechanics of Engineering Structures

CES 3102 - Section 4872

Class Periods: 8:30 am – 10:25 am (Periods 2-3), Tuesday & Thursday

Location: Fine Arts B 103

Academic Term: Fall 2024

Instructor:

Jennifer A. Bridge, Ph.D.

jennifer.bridge@essie.ufl.edu (Please do not use Canvas to contact me)

Office Hours: Wednesday, 2:30 – 4:00 pm, in person (Weil 475G) or via [Zoom](#), or email for an appointment

Teaching Assistant: None

Course Description

Introduces structural load, equilibrium, shear and bending moment diagrams, structural analysis software, classical methods for displacement determination, method of consistent deformations, slope deflection method, moment distribution method.

Course Pre-Requisite: EGM 3520, Mechanics of Materials

Course Objectives

The objective of this course is to introduce students to the theory and application of structural analysis methods for trusses, beams, and frames. The applications of these methods are presented in the context of practical structural engineering problems and their relation to subsequent design courses. This course is intended to continue students' development of problem solving and critical reasoning skills essential to their success in professional engineering practice. This course will develop the student's ability to:

1. Identify, formulate, and solve problems encountered in structural analysis as an integral part of the design process in engineering practice
2. Understand the behavior of structures and components under various loading conditions
3. Apply classical and contemporary methods of structural analysis in engineering practice
4. Communicate effectively in homework, quizzes and class discussions to strengthen these skills for use in engineering practice
5. Utilize structural analysis software

Materials and Supply Fees: None

Relation to Program Outcomes (ABET):

Outcome	Coverage
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

Required Textbooks and Software

Text: Structural Analysis, R C. Hibbeler, Edition: any, ISBN number: 0131470892

Structural Analysis Software: [Ftool](#)

Recommended Materials:

Calculators: Only [NCEES approved calculators](#) will be permitted during quizzes. Your quiz will be collected, and your grade will be a zero if you are caught using a non-approved calculator. Approved calculators include the following:

- Hewlett Packard – HP 33s and HP 35s
- Casio – All fx-115 and fx-991 models
- Texas Instruments – TI-30X and TI 36X models

If you are unsure about your calculator, it is your responsibility to check with the instructor for approval. Calculators will not be provided if you forget or bring the wrong calculator.

Required Computer

UF student computing requirement: <https://news.it.ufl.edu/education/student-computing-requirements-for-uf/>

Note that Ftool must run on a Windows computer. If you use a Mac, please access Ftool from [UFApps](#) (R-drive)

Course Schedule (tentative)

Class	Date	Hibbeler Chapter	Topic	HW	
				Assigned	Due
1	8/22/2024	1	Introduction, Materials and Structures, Idealization	1	
2	8/27/2024	2, 5.5	Reactions, Determinacy, Multi-member Structures		
3	8/29/2024	3	Trusses - Method of Joints, Zero Force Members		
4	9/3/2024		Quiz 1 - Reactions, Equilibrium, Determinacy	2	1
5	9/5/2024	3	Trusses - Method of Sections		
6	9/10/2024	4	Shear and Moment Diagrams		
7	9/12/2024	4	Quiz 2 - Trusses	3	2
8	9/17/2024		Shear and Moment Diagrams		
9	9/19/2024	6	Influence Lines - Construction		
10	9/24/2024	6	Influence Lines - Application		
11	9/26/2024	6	Quiz 3 - Shear and Moment Diagrams	4	3
12	10/1/2024		Influence Lines		
13	10/3/2024	8	Beam Deflections - Double Integration		
14	10/8/2024	8	Beam Deflections - Double Int., Analysis Software		
15	10/10/2024	8	Quiz 4 - Influence Lines	5	4
16	10/15/2024		Beam Deflections - Moment-Area		
17	10/17/2024	8	Beam Deflections - Moment-Area		
18	10/22/2024	9	Energy Methods, Virtual Work		
19	10/24/2024	9	Quiz 5 - Double Integration and Moment-Area	6	5
20	10/29/2024		Virtual Work for Beams and Trusses	Frame	
21	10/31/2024	9	Virtual Work for Beams and Trusses		
22	11/5/2024	10	Indeterminate Analysis - Force Method		
23	11/7/2024		Stiffness Method Introduction, Spring Structures		
24	11/12/2024		Indeterminate Analysis - Stiffness Method - Beams		
25	11/14/2024	15*	Quiz 6 - Virtual Work and Force Method	7	6
26	11/19/2024	15*	Indeterminate Analysis - Stiffness Method - Beams		
27	11/21/2024	15*	Indeterminate Analysis - Stiffness Method - Frames		Frame
	11/26/2024 11/28/2024		Break		
28	12/3/2024		Quiz 7 - Indeterminate Analysis		7

Important Dates

9/3/2024	Quiz 1
9/12/2024	Quiz 2
9/26/2024	Quiz 3
10/10/2024	Quiz 4
10/24/2024	Quiz 5
11/14/2024	Quiz 6
11/21/2024	Frame Assignment Due
12/3/2024	Quiz 7 (cannot be dropped)

Attendance Policy, Class Expectations, and Make-Up Policy

This class meets twice a week, 100 minutes per class period. Class will usually consist of lecture and example problems but may also include in-class assignments. A short break will be given part way through the lecture period. Quizzes will be given approximately every two weeks (see schedule above). Regular attendance is strongly recommended for success in this course. While attendance does not make up a specific component of the course grade, it will be reflected in homework and quiz grades.

Students who must miss a quiz due to University-approved activities should notify the instructor in advance with a written explanation for the absence along with the appropriate documentation. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework		
Homework Sets (7)	10 each	15%
Frame Assignment	30	
Quizzes (7)	100 each	85%
		100%

Homework: Eight homework assignments will make up 15% of your final grade. Seven problem sets will be assigned throughout the semester and will be due at midnight the night before the quiz given on the same material (see below). An eighth homework assignment (the Frame Assignment) will be given over the structural analysis software you will learn in class. Homework assignments will be posted on the course website. Homework must be submitted electronically in Canvas with a clearly defined problem statement, given information, required information, calculations, and clearly indicated solution(s). Homework that cannot be read will not be graded. All solutions must have correct units; solutions without correct units will be penalized. Assignments are due at the time indicated on the assignment. **Late homework will not be accepted and will receive a grade of zero.** The lowest homework score will be dropped (not to include the Frame Assignment).

Quizzes: Seven in-class, closed book quizzes will be given. All work and solutions are to be shown on the quiz in the space provided. You will have the entire class period to complete the quiz. The lowest of the first six quiz grades will be dropped. This policy removes the need for make-up quizzes caused by unplanned or conflicting events, illness, etc. No make-up quizzes will be given.

Grading Policy

Percent	Grade	Grade Points
90-100	A	4.0
80-89.9	B	3.0
70-79.9	C	2.0
60-69.9	D	1.0
0 - 59.9	E	0.0

The instructor reserves the right to adjust the grade distributions; grades will not be adjusted for individuals. More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

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/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. **Academic dishonesty will not be tolerated.** Ignorance provides no protection from the consequences. If you have any questions or concerns, please consult with the instructor.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCoe Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/state-authorization-status/#student-complaint>.