

## Advanced Structural Analysis

CES 6016 -11413 – 0885

**Class Periods:** T/Th, Periods 6-7, 12:50 – 2:45 pm

**Location:** Online

**Academic Term:** Fall 2020

### **Instructor:**

Dr. Jennifer Bridge

Email: [jennifer.bridge@essie.ufl.edu](mailto:jennifer.bridge@essie.ufl.edu)

Office Phone Number: (352) 294-7793

Office Hours: Wednesday, 1:30 – 3:00pm on Zoom, or by appointment

**Teaching Assistant:** None

### **Course Description**

Traditional methods of analyses for forces and deformations; modern matrix methods including the direct stiffness method. (3 credits)

### **Course Pre-Requisites**

Fundamentals of structural analysis including loads, shear and moment diagrams, and classical methods for determining displacements.

### **Course Objectives**

To develop the students' 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 matrix methods to analyze two- and three-dimensional structures using hand calculations, MATLAB code, and structural analysis software
4. Communicate effectively in homework, exams, and class discussions to strengthen these skills for use in engineering practice

**Materials and Supply Fees:** N/A

### **Required Software**

MATLAB (<https://www.mathworks.com/products/matlab/student.html>)

Visual Analysis 19 (<https://www.iesweb.com/edu/>)

### **Recommended Text**

Kassimali, A., *Matrix Analysis of Structures*, Second Edition, Cengage Learning, 2011 (ISBN: 9781111426200)

### **Course Schedule (Tentative)**

Week 1:	Background review, software introduction, matrix operations
Week 2:	Force/flexibility method
Week 3:	Stiffness method introduction
Week 4:	Stiffness method for trusses
Week 5:	Stiffness method for beams and 2D frames
Week 6:	Stiffness method for 2D frames
Week 7:	Stiffness method cont., <b>Exam 1</b>
Week 8:	Self-straining, semi-rigid supports
Week 9:	Moment releases, semi-rigid connections
Week 10:	Rigid end offsets, shear deformation
Week 11:	Geometric nonlinear analysis

- Week 12: 3D truss analysis, **Exam 2**
- Week 13: 3D analysis of grids, Thanksgiving holiday
- Week 14: Space frame analysis
- Week 15: Structural optimization, verification & validation
- Finals Week: Final Exam**

***Online Course Recording***

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

***Attendance Policy, Class Expectations, and Make-Up Policy***

This class meets twice a week, with each meeting consisting of two 50-minute periods. Each class will start with a brief review of previous material and/or questions on homework as needed, followed by a lecture on new material. A short break will be taken during the two-period class. 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 exam grades.

Excused absences must be in compliance with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Make-up exams will not be given except in cases of valid medical emergencies (for which the student must provide written documentation) or certain other admissible emergencies. Students who must miss an exam due to University-approved business should notify the instructor **in advance** with a written explanation for the absence along with the appropriate documentation. Students with questions regarding this policy are urged to consult the instructor.

***Evaluation of Grades***

Homework: Homework assignments will make up 35% of your final grade. Problems sets will be assigned throughout the semester and will be due on the posted date. Each completed homework assignment will be submitted electronically as a single file on the course website (Canvas). Assignment submissions may include any combination of hand calculations (completed neatly on engineering paper and scanned), software code/output, or spreadsheets. All work is to be neatly presented with carefully drawn sketches and clearly indicated solutions; sloppy work will receive reduced points. Assignments are due at the time stated on the assignment; technical difficulty during submission is not an excuse for missing a deadline. **Late homework will not be accepted and will receive a grade of zero.** The lowest homework assignment grade will be dropped. Assignments will be evaluated for overall degree of completion. A randomly selected subset of assignments will be graded in detail. Solutions to assignments will be posted on Canvas following assignment due date. Each student is responsible for comparing their solution to that posted by the instructor, thereby determining if errors were made.

Midterm Exams: Two midterm exams will comprise 40% of your final grade (20% each).

Final Exam: A comprehensive final exam will comprise 25% of your final grade. *December 14, 2020, 10am – 12pm*

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Homework Sets	10 each	35%
Midterm Exams (2)	100 each	40%
Final Exam	100	25%
		100%

### ***Grading Policy***

To receive the Structures specialization, you must make a B or better in this class. The *tentative* grading scale is:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
< 60%	E

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

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

### ***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/>.

### ***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/policies/student-honor-code-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. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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 Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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:** <http://www.counseling.ufl.edu/cwc>, 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](mailto: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](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://care.dso.ufl.edu>.

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.