Aerospace Structures
EAS 4200 Class Number 18938
MWF 5th Period (11:45 AM– 12:35 PM)
***Location* WEIL 270**
Fall 2022

Instructor:
B.V. Sankar
sankar@ufl.edu
Office Phone Number (352) 392-6749
Office Hours (Zoom): Tuesdays and Thursdays, 11 AM -12 Noon
In-person meeting by appointment only sankar@ufl.edu

Teaching Assistant:
Please contact through the Canvas website
- Name, email address, office location, office hours (TBA)
- Name, email address, office location, office hours (TBA)

Course Description Credits: 3; Review of plane states of stress and strain. Includes analysis of thin-walled beams with open and closed section, unsymmetrical bending of wing sections, torsion of skin-stringer and multi-cell sections, flexural shear in open and closed sections, Shear Center and failure criteria. Also includes introduction to composite materials and demonstration of behavior of some simple structural elements.

Course Pre-Requisites EGM3520 Mechanics of Materials

Course Objectives Upon completion of this course, students will demonstrate:
1) Knowledge of modern aerospace structural materials and their selection for various aircraft components.
2) Ability to use engineering science tools such as advanced mathematics, stress analysis.
3) Ability to perform stress and deformation analysis on common structural forms found on aerospace structures.
4) Knowledge of failure criteria for engineering materials.
5) Ability to design simple aerospace structures to support mechanical loads.

Materials and Supply Fees None
Relation to Program Outcomes (ABET):
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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	Medium
3. An ability to communicate effectively with a range of audiences	
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	Medium

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

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

***Required Textbooks*:** None. Notes will be posted.
Software: Excel and MATLAB will be helpful in HWs and project.

Recommended Materials

Mechanics of Aircraft Structures, C.T. Sun, John Wiley & Sons, 2nd Edition, 2006

Aircraft Structures for Engineering Students, T.H.G. Megson, Butterworth, 5th Edition

Introduction to Aerospace Structural Analysis, D.H. Allen and W. Haisler

Advanced Mechanics of Materials, A.P. Boresi and R.J. Schmidt, 6th Edition, John Wiley, 2003, ISBN 0-471-43881-2

Course Schedule

Topics

- Introduction
- Introduction to elasticity
- Torsion and bending of beams
- Analysis and design of thin-walled beams
- Failure, fracture, and fatigue of materials
- Buckling
- Materials for aerospace structures

Lecture	Date	Day	Topic	HW/Quiz/Exam
1	24-Aug	Wed	1. Introduction	
2	26-Aug	FRI	1. Introduction	
3	29-Aug	MON	1. Introduction	
4	31-Aug	Wed	2. Theory of Elasticity	HW 01
5	2-Sep	FRI	2. Theory of Elasticity	
-	**5-Sep**	**MON**	**Labor Day**	**Holiday**
6	7-Sep	Wed	2. Theory of Elasticity	HW 02
7	9-Sep	FRI	2. Theory of Elasticity	
8	12-Sep	MON	2. Theory of Elasticity	
9	14-Sep	Wed	2. Theory of Elasticity	**Quiz 1,** HW 03
10	16-Sep	FRI	3. Advanced Beams	
11	19-Sep	MON	3. Advanced Beams	
12	21-Sep	Wed	3. Advanced Beams	HW04
13	23-Sep	FRI	3. Advanced Beams	
14	26-Sep	MON	3. Advanced Beams	

-	**28-Sep**	**Wed**	**Exam 1**	**Exam 1**
15	30-Sep	FRI	3. Advanced Beams	
16	3-Oct	MON	4. Torsion	
17	5-Oct	Wed	4. Torsion	HW 05
18	7-Oct	FRI	4. Torsion	**(Possible Homecoming Holiday)**
19	10-Oct	MON	4. Torsion	
20	12-Oct	Wed	4. Flexural Shear	HW 06
21	14-Oct	FRI	4. Flexural Shear	
22	17-Oct	MON	4. Flexural Shear	
23	19-Oct	Wed	4. Flexural Shear	**Quiz 2,** HW 07
24	21-Oct	FRI	5. Failure, Fatigue and Fracture	
25	24-Oct	MON	5. Failure, Fatigue and Fracture	
26	26-Oct	Wed	5. Failure, Fatigue and Fracture	HW 08
27	28-Oct	FRI	5. Failure, Fatigue and Fracture	
28	31-Oct	MON	5. Failure, Fatigue and Fracture	
-	**2-Nov**	**Wed**	**Exam 2**	**Exam 2**
29	4-Nov	FRI	5. Failure, Fatigue and Fracture	
30	7-Nov	MON	5. Failure, Fatigue and Fracture	
31	9-Nov	Wed	5. Failure, Fatigue and Fracture	HW 09
-	**11-Nov**	**FRI**	**Veterans Day**	**Holiday**
32	14-Nov	MON	6. Buckling	
33	16-Nov	Wed	6. Buckling	HW 10
34	18-Nov	FRI	6. Buckling	
35	21-Nov	MON	6. Buckling	
-	**23-Nov**	**Wed**	**Thanksgiving**	HW 11 (due on Tuesday)
-	**25-Nov**	**FRI**	**Thanksgiving**	
36	28-Nov	MON	6. buckling	
37	30-Nov	Wed	7. Aerospace Materials	Quiz 3, HW 12
38	2-Dec	FRI	7. Aerospace Materials	
39	5-Dec	MON	**Exam 3**	**Exam 3**
40	7-Dec	Wed	**Review**	HW 13
	13-Dec	**TUE**	**Exam 4***	**3-5 PM**

***The fourth and final exam on December 16th is optional for those who want to improve their grades. In that case, the fourth exam grade will <u>replace</u> the lowest score of the first three exams irrespective of whether the score in the 4th exam is greater or less than the minimum of the first three.**

Attendance Policy, Class Expectations, and Make-Up Policy

Regular lectures will be held in person in Weil Hall, room 270. The instructor will also use Zoom for live streaming, and the lectures will be uploaded to Zoom cloud. Attendance at the in-person lectures is not required and will not be tracked.

All quizzes/exams are to be completed at home with prescribed time allotment, plus student accommodations as applicable. All homework assignments are also to be completed at home. No late homework will be accepted. However, two home-works with low scores will be dropped.

Please contact Professor Sankar via email if you need to make up any of the quizzes due to for example, illness. Documentation needed for any approved reasons for makeup exams.

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	Points	percentage of final grade
Homework	20 each	10%
Quizzes (3)	20 each	25%
Projects	100	5%
Midterm Exams (3)	60 each	60%
Final Exam* (optional)	60 points	-

Grading Policy

Percent	Grade	Grade Points
92.0 - 100	**A**	**4.00**
89.0 - 91.9	**A-**	**3.67**
86.0 - 88.9	**B+**	**3.33**
82.0 - 85.9	**B**	**3.00**
79.0 - 81.9	**B-**	**2.67**
76.0 - 78.9	**C+**	**2.33**
72.0 - 75.9	**C**	**2.00**
69.0 - 71.9	**C-**	**1.67**
66.0 - 68.9	**D+**	**1.33**
62.0 - 65.9	**D**	**1.00**
59.0 - 61.9	**D-**	**0.67**
0 - 58.9	**E**	**0.00**

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. 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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.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 suppor*t*, 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*.