

Aerospace Structures
EAS 4200 Class Number 21251
Location: Online – Asynchronous
Academic Term: Fall 2020

- URL for lecture videos: <https://ufedge.video.ufl.edu/Mediasite/Catalog/catalogs/fall2020-eas-4200>
- **Class Periods:** MWF, 5th period, 11:45 AM – 12:35 PM (used for exams and synchronous class activities)
- Students should watch each lecture video on or before the day shown in the course schedule given below.
- *It may become necessary to modify this syllabus during the semester. In this event, students will be notified and the revised syllabus will be posted on the course web site.*

Instructor:

Professor B.V. Sankar

sankar@ufl.edu

Office Hours: MWF 6th period (12:50 PM - 2 PM) Zoom. Students should email instructor questions, if possible.

Additional Zoom office hours upon request.

Teaching Assistants

Please contact through the Canvas website

- Brandon Tran, tranb@ufl.edu
- Mark Yen, markyen@ufl.edu
- Benjamin Bui, bbui1@ufl.edu

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 / Co-Requisites

EGM 3520 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

N/A

Professional Component (ABET):

4A. EAS 4200 supports several program outcomes enumerated in the Mission Statement of the Department of Mechanical and Aerospace Engineering. Specific ASE program outcomes supported by this course include: (1) Possess knowledge of aerospace structures and materials (ASE Program Outcome A5).

4B. Mathematical Sciences (15%), Physical Sciences (15%), Engineering Sciences (70%)

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	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 and Software

Course notes are developed by the instructor and posted in CANVAS

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

Topics

1. Introduction
2. Introduction to elasticity
3. Bending of beams
4. Torsion
5. Flexural Shear
6. Failure, fracture and fatigue of materials
7. Buckling
8. Energy Methods
9. Materials for aerospace structures

Course Schedule (Tentative, subject to some changes)

Lecture	Date	Day	Topic	HW/Quiz/Exam
1	31-Aug	Mon	1. Introduction	
2	2-Sep	WED	1. Introduction	
3	4-Sep	FRI	1. Introduction	
-	7-Sep	Mon	Labor Day	Holiday
4	9-Sep	WED	2. Theory of Elasticity	HW01
5	11-Sep	FRI	2. Theory of Elasticity	
6	14-Sep	Mon	2. Theory of Elasticity	
7	16-Sep	WED	2. Theory of Elasticity	Quiz 1, HW02
8	18-Sep	FRI	2. Theory of Elasticity	
9	21-Sep	Mon	2. Theory of Elasticity	
10	23-Sep	WED	3. Advanced Beams	HW03
11	25-Sep	FRI	3. Advanced Beams	
12	28-Sep	Mon	3. Advanced Beams	Quiz 2
13	30-Sep	WED	3. Advanced Beams	HW04
-	2-Oct	FRI	Homecoming	No Class
14	5-Oct	Mon	3. Advanced Beams	
-	7-Oct	WED	Exam 1	Exam 1
15	9-Oct	FRI	4. Torsion	
16	12-Oct	Mon	4. Torsion	
17	14-Oct	WED	4. Torsion	HW05
18	16-Oct	FRI	4. Torsion	
19	19-Oct	Mon	4. Flexural Shear	Quiz 3
20	21-Oct	WED	4. Flexural Shear	HW06
21	23-Oct	FRI	4. Flexural Shear	
22	26-Oct	Mon	4. Flexural Shear	HW06
23	28-Oct	WED	5. Failure, Fatigue and Fracture	
24	30-Oct	FRI	5. Failure, Fatigue and Fracture	Quiz 4
25	2-Nov	Mon	5. Failure, Fatigue and Fracture	HW07
26	4-Nov	WED	5. Failure, Fatigue and Fracture	
27	6-Nov	FRI	5. Failure, Fatigue and Fracture	HW08
-	9-Nov	Mon	Exam 2	Exam 2
	11-Nov	WED	Veterans Day	Holiday
29	13-Nov	FRI	5. Failure, Fatigue and Fracture	
30	16-Nov	Mon	5. Failure, Fatigue and Fracture	HW09
31	18-Nov	WED	5. Failure, Fatigue and Fracture	
32	20-Nov	FRI	6. Buckling	
33	23-Nov	Mon	6. Buckling	Quiz 5, HW10
	25-Nov	WED	Thanksgiving	Holiday
	27-Nov	FRI	Thanksgiving	Holiday
34	30-Nov	Mon	6. Buckling	
35	2-Dec	WED	6. Buckling	HW11
36	4-Dec	FRI	6. buckling	
37, 38	7-Dec	Mon	7. Aerospace Materials	HW12
-	9-Dec	WED	Exam 3	Exam 3

	17-Dec	THU	Exam 4 12:30 -1 :30 PM	Exam 4

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

It is extremely important that students watch the lecture videos on or before the suggested date in the course schedule. Not watching videos in a timely manner results in poor or mediocre performance. Excused absences at the quizzes and exams must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Re-grading Policy: Any re-grade requests must be submitted in writing using the form available in the course website in CANVAS within two days after return of the graded paper. The written request must explain in detail what you want the grader to do and where you believe s/he has made a mistake in grading. These requests will be accepted by Dr. Sankar only.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (~10)	20 each	10%
Quizzes (4)	20 each	25%
Exams (3)	60 each	60%
Fourth Exam	60	-
Project	100	5%
	TOTAL	100%

Students are allowed one formula sheet (8½ × 11 inch) written on both sides for the quizzes and exams.

Two HWs and one quiz will be dropped.

***Caution:** The fourth and final exam on Thursday December 17th is optional for those who want to improve their grades. In that case, the fourth exam grade will **replace** 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.

Grading Policy

Percent	Grade	Grade Points
93	A	4.00
90	A-	3.67
86.5	B+	3.33
83	B	3.00
80	B-	2.67
76.5	C+	2.33
73	C	2.00
70	C-	1.67
66.5	D+	1.33
63	D	1.00
60	D-	0.67

0 - 59.9	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.a.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.a.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
- 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: <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

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 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>.