

## **Applied Elasticity and Advanced Mechanics of Solids**

**EGM 5533**

**Class Periods in Gainesville:** Monday, 2<sup>th</sup> period; Wednesday, 2<sup>th</sup> period; Friday, 2<sup>th</sup> period (8:30-9:30 AM)

**Location:** CSEE107

**Academic Term:** Fall 2022

### **Instructor:**

Dr. Benoit Revil-Baudard

Office: 153 UF/REEF, Shalimar, FL 32579

Office hours: Tuesday 10:00 am to 12:00 pm CT

Phone: (850) 833-9350 ext. 241

E-mail: revil@ufl.edu

### **Gainesville Campus Grader:**

#### **TA's Office:**

Please contact through the Canvas website

**Class Website:** <https://elearning.ufl.edu/>

Login using your gatorlink username and password to access Canvas

**In REEF/Shalimar, class meets on Monday: 1.00 pm-4.00 pm (REEF class room)**

### **Course Description**

Credits 3

### **Course Pre-Requisites / Co-Requisites**

Completion of undergraduate course in mechanics of materials (EGM 3520) or strength of materials or permission of the instructor.

### **Course Objectives**

The major goal of this course is to provide exact (Theory of Elasticity) and approximate (Adv. Mech. Materials) methods in the analysis of solids and structures. Furthermore, this course will provide general concepts behind continuum solid mechanics, elements of thermoelasticity, isotropic elasticity and introduction to plasticity. The methods are applicable to design and analysis of mechanical, aerospace and civil engineering structures.

### **Materials and Supply Fees**

### **Recommended Textbooks and Software**

- Title : Advanced Mechanics of Materials and Applied Elasticity
- .Authors: C. Ugural and S.K. Fenster
- Eidtor: Pearson, 5<sup>th</sup> edition or 6<sup>th</sup> edition
- ISBN number: 5<sup>th</sup> edition: or 6<sup>th</sup> edition: 0134859286

Course notes used in class will be provided to the students after each lectures.

### **Reference book:**

Theory of Elasticity, S.P. Timoshenko and J.N. Goodier, 3<sup>rd</sup> Edition, McGraw-Hill.

### **Course Schedule**

Week 1: Introduction: Review of vector and tensor algebra and calculus

Week 2: Stress at a point : Cauchy theorem, Equilibrium equations, Mohr circle

Week 3: Strain in a deformable body/ Strain theory

Week 4:	General principles/Thermo-elasticity/ isotropic elastic solid
Week 5:	Linear elasticity law: Isotropic and anisotropic elastic solid/ Exam
Week 6:	Plane stress elasticity problems
Week 7:	Introduction to inelastic material behavior
Week 8:	Energy methods: Virtual work / Castigliano's theorems
Week 9:	Torsion of shafts: St Venant semi-inverse method/circular and non circular cross-section
Week 10:	Exam / Inelastic torsion of shaft
Week 11:	Bending of beams : symmetrical cross-sections
Week 12:	Bending of beams : non-symmetrical cross-sections
Week 13:	Point/line force acting on the surface of an infinite half-space: Boussinesq and Flamant solution
Week 14:	Thick wall cylinder (1)
Week 15:	Thick wall cylinder (2) / Exam
Week 16:	Stability of columns

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

**Course web site:** A course web site is established thru UF/EDGE. Students will be expected to check it on a regular basis for up-to-date course information. This may include changes to the syllabus, homework assignment due dates, and exam schedules.

**Exams:** Three 1-hour exams will be given during the semester during the regularly scheduled class time. No final exam will be given.

*Tentative schedule of the exams: Exam1: September 21<sup>nd</sup>; Exam 2: October 31<sup>th</sup>, Exam 3 : November 30<sup>th</sup>*

No exams will be given prior to the scheduled dates and no makeup exams will be given. No books, tables, or calculators are allowed.

**Homework:** Problems will be assigned on Wednesday and collected at the end of the following Wednesday class meeting. Late homework will not be accepted. However, hardship cases will be considered on an individual basis and only if the instructor has been contacted before the due date of the assignment.

Excused absences must be consistent with university policies in the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

### **Evaluation of Grades**

Assignment	Total Points	Percentage of Final Grade
Homework (6 hwk)	100 each	25%
Exam 1	100	25%
Exam 2	100	25%
Exam 3	100	25%
		100%

### **Grading Policy**

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67

66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

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.ua.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.ua.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](mailto:jpennacc@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:** <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](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.  
<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>.