EGM 3520 Mechanics of Materials
Spring 2021
Class # 12053 / 12126 / 25507

Instructor

Dr. Amie Baisley, Lecturer
>Office: A Zoom link will be posted to Canvas each week for you to join for office hours
>Email: amie.baisley@eng.ufl.edu
>Office Hours: Monday 1:00pm – 2:00pm
>>Tuesday 1:00pm – 2:00pm (if these times do not work for you then send me an email and I will gladly schedule a time to meet with you that works with your schedule)

Course Website: Canvas. EVERYTHING will be posted to Canvas.

Course Interaction: Although the course has been changed to an online offering, all classes will meet at their regularly scheduled time each MWF on Zoom. The material is best learned through interaction and engagement, so synchronous sessions will help foster this.

Instructional Staff

The instructional team will consist of the instructor and a group of undergraduate peer tutors for the course. The peer tutors will be heavily involved in class time and will hold office hours outside of class to meet with students as well. You are welcome to attend any of the peer tutor office hours even if they are not the students you see in your course section. The best way to communicate with any person on the instructional staff is by e-mail, the addresses will be posted under the *Course & Staff Info.* menu on Canvas.

Meeting Times and Rooms

There are three sections of the course:

>Class Number 12053
>>Meeting times: MWF 3 (9:35am – 10:25am)
>>**Final Exam** 4/26/21 10:00am-12:00pm

>Class Number 12126
>>Meeting times: MWF 5 (11:45am – 12:35pm)
>>**Final Exam** 4/30/21 7:30am-9:30pm

>Class Number 25507
>>Meeting times: MWF 8 (3:00pm – 3:50pm)
>>**Final Exam** 4/28/21 3:00am-5:00pm

Catalog Description

Stress and strain at a point, stress-strain-temperature relations and mechanical properties of materials. Systems subject to axial load, torsion, and bending. Design concepts, indeterminate structures and applications.

Prerequisites

>EGM 2511 Statics
>MAC 2313 Analytic Geometry and Calculus 3

Course Objectives

a) Students understand and appreciate the relationship between the underlying principles of mechanics and the behavior of deformable systems.

b) Students can represent physical bodies and restraints as idealized mechanical systems.

c) Students can analyze bars in axial, torsional, and bending deformation due to external forces using analytical means and numerical methods implemented in computer programs.

d) Students can apply the principles of mechanics to systems in the context of design or other similar engineering contexts.

e) Students understand and appreciated the relationship between natural forces and their idealization in modeling.

f) Students advance their abilities to solve engineering problems and to communicate the outcomes of technical investigations.

g) Students will be prepared for more advanced study of engineering mechanics.

Professional Component (ABET):

This course is designed to identify and formulate solutions to mechanics problems using the students math and science background. This will be done using modern engineering tools and techniques to provide effective communication of the students work. The techniques are developed to encourage lifelong learning.

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	Low
3. An ability to communicate effectively with a range of audiences	Medium
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	Low
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	Low
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

Topics Covered

- Axially loaded members
- Torsion
- Tension, compression, and shear forces
- Beam bending and deflection
- Stress and deflection in beams
- Stress and strain analysis
- Buckling

Materials and Supply Fees

None

Texts and Readings:

A set of Course Notes, examples, and other information will be posted on the course Canvas page. These items constitute the textbook for the course.

I am happy to give guidance on additional reference books. The problem is not so much that there are too few resources, it is that there are too many, and they do not all agree on notation and approach. You will find that the solution process in this course is different than most textbook examples.

Course Schedule

The details and due dates of everything are posted to the document *EGM3520 Schedule SP21* on Canvas.

Week 1:   Intro to Course / Module 1
Week 2:   Module 1 – Axial Loading
Week 3:   Assessment 1
Week 4:   Module 2 – Torsion
Week 5:   Assessment 2
Week 6:   Module 3 – Beam Equilibrium and Stress
Week 7:   Assessment 3
Week 8:   Module 4 – Beam Deformation
Week 9:   Assessment 4
Week 10:   Module 5 – Multiaxial States - Stress
Week 11:   Assessment 5
Week 12:   Module 6 – Multiaxial States - Strain
Week 13:   Assessment 6
Week 14:   Module 7 – Buckling
Week 15:   Assessment 7
Week 16:   Final Exam

Organization of the Course:

See the separate course calendar posted to the Canvas page.

The course is organized into seven modules, each of two week duration. Each module will include new lecture video(s) and examples, 3 recitation sessions, one rehearsal exam, and one module assessment. During the recitations, students will actively work on problems associated with the topic and will continue to exercise those ideas as homework problems. There will be an examination style assessment at the end of each module. Each student will also be required to complete three computing projects, each culminating in a final report.

Coursework

The course will include several different kinds of work with different expectations associated with each. Each student is expected to complete all assigned work within the period granted. Late work will not be accepted.

The coursework includes:

Recitation work: Recitation sessions will center on group problem solving. All students are expected to actively contribute to their group in solving these problems. The instructional team will be joining in to your group sessions to answer questions during these periods. All in-class work will be counted as part of the student's progress in the course. **_Engagement and participation counts!_**

The recitation problems will be posted to Canvas the night before each recitation. During recitation each group is to work on the problem(s) that they choose. Several days later, every **_individual student_** will submit **_completed_** solutions in the required format to Canvas. Therefore, it is **_not necessary to complete each problem during the recitation session_**. The goal of recitation is for each group to form a solid framework for each problem solution in class, while the instructional team is available for support.

Rehearsal Exams: "Rehearsals" take place in class prior to the module assessment and are very similar to an exam but are "open everything" which means you can use computers, classmates, talk to the instructional team, …, everything. The last 5 minutes of class will be reserved for grading the rehearsal exam.

Late work: The due date of required work is noted in the _EGM3520 Schedule SP21_. Late work will not be accepted.

**Please note:_ Learning is best achieved in an environment where discussions take place. Thus, as in recitations, you may find it beneficial to discuss your homework with other class participants in a small study group of approximately 3 to 5 students. I welcome collaborative work; however, in order to be successful on exams, you must be able to solve the problems on your own. If this is not the case, you will have great difficulty performing well on assessment exams and computing projects in this course.

Module Assessments

Progress and mastery of concepts will be assessed each module. The assessment for each module will be done individually, during class time, and without access to any additional resources. Your hand-written problem solutions on module assessments and the final exam must be neat and legible and **_must follow the required format_** (which is the same as recitation work and all solutions in this course).

The dates for each module assessment are published on the _EGM3520 Schedule SP21_ on Canvas.

There are no makeup opportunities for module assessments. If you miss an assessment then you have only missed an opportunity to demonstrate your mastery, but your course grade will not and cannot be reduced (because it is not based on averages). This does mean that it will also not improve if you miss an assessment. To "make up" for the missed assessment you simply have to use your remaining assessment opportunities to their fullest.

A reference sheet may be used during all assessments. The sheet must be **_hand written (no photocopies or printouts)_** and it can be no larger than 1 side of an 8.5" x 11" sheet.

Computing Projects

There will be three computing projects that reinforce the ideas covered in the modules and the problems worked in recitations. Students will modify MATLAB programs to numerically compute the behavior of a problem and then use the program to explore unique aspects of the problem. There is no requirement for extensive knowledge of programming. Each student will have the opportunity to develop the requisite programming skills through the execution of the computing projects.

A final written report is required for each computing project. Each student is responsible for a unique report. The reports must be prepared in accord with the guidelines presented in *Guidelines for CPs* and the evaluation guide *Evaluation of CPs*.

The programs are planned as follows:

> CP 1. *Axial/Torsion Bar*
> CP 2. *Beam Deformation*
> CP 3. *Design*

Engagement:

This course is designed for high engagement of the students. There will be multiple ways to demonstrate engagement in this course through class participation, homework quality, self-assessments, etc.:

Class participation: During class we will be working, usually in groups, on solving problems. Engagement means coming prepared, working actively during the class, asking questions, showing leadership in the group, etc.

Homework: The completion and quality of assigned homework will count towards engagement. The students also have the opportunity to participate in the development of additional examples for all students.

Self-Assessment: After each module assessment the students will have an opportunity to provide a self-assessment of their work. The completion and accuracy of the self-assessment will count towards engagement.

General Approach: The most effective learning is driven by curiosity; the most effective learners are aware of their own intellectual development. Engagement includes the regular demonstration of these attributes. To do so elevates the learning environment for everyone.

Grading Criteria

Your final grade in the course will be based upon the degree of mastery of the ideas in each module, as demonstrated through the mastery assessments, the completion of the computing projects, and the level of engagement in the course throughout the semester. Your course grade is made up of the following:

$$Score \ = \ [\ (0.7 * Assessments) + (0.3 * Computing \ Projects \ ) \ ] * Engagement$$

The aim is to promote mastery and not just add up points. Engagement will serve as a course multiplier (think of it as a cup to fill up by continually accruing credits for engagement activities—there are more than enough opportunities and there is no upper limit to engagement points).

I will be tracking progress on key ideas and will associate mastery with multiple consistent demonstrations of knowledge. The opportunity to demonstrate mastery will exist right up to the last minute of the final exam (but don't wait until then). The computing project portion of the grade is based on the three projects that will be evaluated following the document *Evaluation of CPs*.

Your score will increase throughout the semester as assessments are completed and assignments are turned in. Everyone starts at a score of 0 (which is very different than a typical weighted average grade system). Do not let the low score worry you as it will only increase with each opportunity. Your final score at the end of the semester determines your grade in the course based on the following conversion table:

S Index (Score)	Grade
105+	A
92-104	A-
84-91	B+
76-83	B
68-75	B-
60-67	C+
52-59	C
44-51	C-
<44	E

For more information on how the grading works in this class see the notes *EGM3520 Assessing Mastery* on the Canvas page.

Class Absences:

Class attendance is expected for all class meetings and is included in the engagement part of your grade. You are responsible for any missed class material and class announcements. An excused absence must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and requires appropriate documentation.

General Class Policies

1. Attend each Zoom session on time and be prepared. Have the preparatory reading done and ***be ready to ask questions*** and actively work and discuss the day's topic.

2. Class schedule and effort expectations: 3 hours of inclass meetings per week equals a *minimum* of 9 hours out-of-class work per week.

3. Professional presentation is expected in all submittals.

4. Retain originals or copies of all graded material for your records and for future reference.

5. Be respectful and considerate of everyone.

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.

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.

A violation of the honor code will result in academic sanctions (typically a failing grade assigned for the course) and further disciplinary action. 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 Undergraduate 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 and Copyrighted Material
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use and the use of copyrighted material. 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 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 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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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