

EGM 3520: Mechanics of Materials (Spring 2022)

Lecture times and days: 7th and 8th Period, MWF in Weil Hall 270

Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on announced in class and on CANVAS.

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Catalog Description: Credits: 3; 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.

Pre-requisites and Co-requisites: Prerequisites: Statics EGM 2511 and Calculus III MAC 2313.

Textbook: Beer, F., Johnston, E.R., DeWolf, J., and Mazurek, D.F., "Mechanics of Materials", **8th or 7th edition**, McGraw Hill.

Materials and Supply Fees: None

Instructor: Dr. Dan Dickrell
Department of Mechanical & Aerospace Engineering
130 Building MAE-C
E-mail: djd3@ufl.edu

Office hours: TBA

Teaching Assistant Office Hours: Office hours with teaching assistants will be available. Locations and schedule are posted on CANVAS.

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Course Online Resources: E-Learning/CANVAS system (<https://lss.at.ufl.edu/>)—all documents, homework, grades, etc. will be posted on this system.

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Course Topics:

Chap 1 Concept of Stress

Chap 2 Stress and Strain

Chap 3 Torsion

Chap 4 Pure Bending

Chap 5 Analysis and Design of Beams for Bending

Chap 6 Shearing Stresses in Beams and Thin-Walled Members

Chap 7 Transformations of Stress and Strain

Chap 8 Principal Stresses Under a Given Loading

Chap 9 Deflection of Beams

Chap 10 Columns

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Course Objectives: The purpose of the course is to provide students with the means of analyzing and designing various machine and load bearing structures. Upon completion of this course each student should have:

1. Basic understanding of engineering mechanics and the ability to apply this understanding to analyze and solve a given problem.
2. Basic understanding of material properties and mechanical deformation.
3. The ability to apply advanced science and engineering principles in the design and analysis of structures to support loads within a given limit of safety.

Contribution of course to meeting the professional component:

EGM 3520 supports several program outcomes enumerated in the Mission Statement of the Department of Mechanical and Aerospace Engineering (MAE). Specific MAE program outcomes supported by this course include: Being able to work professionally in mechanical systems areas including the design and realization of such systems. (**ME Program Outcome M4**).

Mathematics (25%), Engineering Sciences (50%), Engineering Design (25%)

Relationship of course to program outcomes:

This course achieves the following Accreditation Board for Engineering and Technology (ABET) outcomes [note that the outcome number corresponds to the respective ABET outcomes (a) through (k)]:

(a) Apply knowledge of mathematics, science, and engineering [**high coverage; method of assessment is homework and 3 exams to measure Outcome (a)**]

(c) Design a system, component or process to meet desired needs [**low coverage; method of assessment is homework and exam problems related to design of trusses, frames and machines for desired functionalities**]

(e) Identify, formulate, and solve engineering problems [**high coverage; method of assessment is homework and 3 exams to measure Outcome (e)**]

(f) Understand professional and ethical responsibilities [**medium coverage; method of assessment is class examples and homework assignments of practical applications and designs involving professional engineering ethical application of proper engineering principles learned in statics**]

(k) Use the techniques, skills and modern engineering tools necessary for engineering practice [**low coverage, no formal assessment to measure Outcome (k)**].

Assessment Methods: Your grade for this course will be determined based on your performance on homework and exams as follows:

Homework (10%): Homework in this class is important. Graded homework assignments are due approximately every Wednesday and Friday. The role of homework problems is to build analytical skills you will need in real world practice, rather just helping prepare to take exams.

TAs have been instructed to look at the problem solving process and explanations, not just answers.

Rules: Homework is to be turned in electronically on the Canvas website **before class on the date indicated on your assignment sheet.**

- **No late homework accepted** unless documented per University policy
- All problems from each homework assignment will be graded.
- Your two worst homework scores will be dropped. Please note that these drops account for any absences excused or otherwise.

- Written homework must adhere to the following format.
 - It should be written and photographed/ scanned clearly
 - Include a **clear problem statement and appropriate free-body diagram**
 - Each problem should be on a single sheet of paper
 - **Solution must be inside a box** with appropriate significant digits.

- Working in groups is permitted and encouraged. However, **copying homework is not permitted.**

- Use of online help or solution manuals to complete homework is considered cheating and a violation of the honor policy. If you are caught, this policy will be fully enforced.

Quizzes (20%)

- 6 quizzes will be given. Quizzes will be announced on Canvas and be given the last 15 minutes of class on the appointed days.
- The lowest quiz score will be dropped.
- No makeup quizzes are allowed unless absence documented per University policy.
- Quiz problems will be similar to the homework and include conceptual questions. Students are permitted to use a calculator for quizzes but no additional materials (note cards, formula sheets)

Exams (40%)

- Two exams (20% each) will be given as indicated on the schedule. Exams will be nighttime exams and two hours in duration.

- All exams will include comprehensive topics covered in class to date. Problems will be similar to homework and quiz problems but will include longer, comprehensive questions as well.

Final Exam (30%)

- The final exam will include comprehensive topics covered in class.

Proposed grading scale

92-100 = A, 90-91.9 = A-, 88-89.9 = B+, 82-87.9 = B, 80-81.9 = B-, 78-79.9=C+, 72-77.9=C, 70-71.9 = C-, 67-69.9=D+, 63-66.9 = D, 60-62.9 = D-, <60 = E

N.B. A grade of C- will not be a qualifying grade for critical tracking courses. Furthermore, in order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). For more information on grades and grading policies, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Re-grading Policy: Any re-grade requests must be submitted in an e-mail or in writing within two weeks after return of the graded paper. The written request must explain in detail what you want the grader to do and where you believe he/she has made a mistake in grading.

Attendance and Excused Absences: Even though attendance is not required, it is extremely important that students attend the class regularly. If you miss a lecture you are responsible for finding out from a classmate what we did in class. If you have a documented and excusable absence for a sustained period (> 1 week) please contact the professor to make any special arrangements.

Homework extensions and make-up quizzes/exams will be provided for excused absences in which notification is provided **before** the assignment date. For excused absences or exam conflicts, students must contact Dr. Dickrell a week in advance of the exam to make special arrangements. Unless there is a documented excused absence, e.g., extreme medical emergency or family crisis, no credit will be given for a missed exam. It is the student's responsibility to make sure he/she is available to take the exam. <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Miscellaneous Policies: Students will be held responsible for knowledge of all scheduling and policy announcements made in class.

Academic Honesty: 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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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. If you have any concerns, please consult with Dr. Sarntinoranont at anytime during the course.

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Course Evaluations: 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/>.

Software Use: All faculty, staff and student 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 peers to the highest standards of honesty and integrity.

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Student Privacy: There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

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Accommodations For Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

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 (Dr. Sarntinoranont)
- 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@ufl.edu

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. 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) at Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies),
or <http://www.police.ufl.edu/>.

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

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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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