

EGM2511 Engineering Mechanics: Statics
Spring 2020
Class # 12173 / 24131 / 24133

Instructor

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Office Hours: Tuesday 10:00am - 12:00pm (if this time does not work for you then send me an email and I will gladly meet with you at a time that works for you)

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

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 12173

Meeting times: MWF 3 (9:35am – 10:25am)

Room: LAR 0239

Class Number 24131

Meeting times: MWF 5 (11:45am – 12:35pm)

Room: PSY 0151

Class Number 24133

Meeting times: MWF 7 (1:55pm – 2:45pm)

Room: AND 0134

Final Exam (All Sections): Saturday 4/25 at 7:30am

Catalog Description

Reduction of force systems, equilibrium of particles and rigid bodies, vector methods and their application to structures and mechanisms.

Prerequisite

PHY 2048 Physics with Calculus 1

Corequisite

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 static mechanical systems.

- b) Students can represent physical bodies and restraints as idealized statical systems.
- c) Students understand the relationship between natural forces and how to properly model them.
- d) Students can analyze particles and rigid bodies subjected to external forces using analytical means and numerical methods implemented in computer programs.
- e) Students can apply the principles of statics to systems in the context of design or other similar engineering contexts.
- 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 and dynamics.

Relation to ABET Program Outcomes

- Apply knowledge of mathematics, science, and engineering
- Identify, formulate, and solve engineering problems
- Communicate effectively
- Understand the impact of engineering solutions in a global, economic, environmental, and societal context
- Recognize the need for and be able to engage in lifelong learning
- Use techniques, skills, and modern engineering tools necessary for engineering practice

Topics Covered

- Free Body Diagrams and Static Equilibrium
- Vector Principles, Forces and Moments, Distributed Effects
- Fluid Statics
- Friction
- Internal Forces and Bending Moments
- Analysis of Simple Structures (Trusses, Frames)

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.

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 one lecture, 2-3 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 four 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 walking around the class answering questions and engaging with the groups during these periods. All in-class work will be counted as part of the student's progress in the course. **Engagement and participation counts!**

Recitation problems will be provided as PowerPoint slides posted on Canvas the evening prior to each recitation session. After each recitation, **one member from each group** will electronically submit the solution work that was generated by the group during the session. Several days later, every **individual** will submit **completed** solutions that are computer generated and in the required format. Therefore, it is **not necessary to complete each problem during the recitation session**. Each group must 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 peer grading of the rehearsal exam.

Late work: The due date of required work is noted in the *EGM 2511 Course Schedule*. 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 *EGM 2511 Course Schedule* on Canvas. The date and time of the final exam follows the University Final Exam Schedule based on the assemble exam for EGM 2511.

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 four computing projects that reinforce the ideas covered in the modules and the problems worked in recitations. Students will write MATLAB programs to numerically compute the static 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. *Beam Analysis*
CP 2. *Connectivity*

CP 3. *Truss Analysis*
CP 4. *Shear and Bending Diagrams*

Engagement:

This course is designed for high engagement of the students. There will be only one formal lecture per module. The remaining sessions will involve active work on the learning of the course materials along with additional outside work. There will be multiple ways to demonstrate engagement in this course:

Class participation: In class we will be working, usually in groups, on solving statics problems. Engagement means coming prepared, working actively during the class, asking questions, showing leadership in the group, participating in the daily feedback (either through exit cards or through electronic means like comments on the *Statics Blog*).

Homework: The completion and quality of assigned homework will count towards engagement. Engagement opportunities are available not only through submission, but also through evaluating and commenting on the work of others. 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.

Please refer to the *Course Introduction* notes in the *Course Notes* menu on the Canvas website for more information on engagement and engagement points.

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:

$$\text{Grade} = [(0.65 * \text{Assessments}) + (0.35 * \text{Computing Projects})] * \text{Engagement}$$

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 four projects that will be evaluated following the document *Evaluation of CPs*.

For more information on how the grading works in this class see the notes *EGM2511 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. Come to class on time and be prepared. Have the preparatory reading done and **be ready to ask questions** and actively discuss the day's topic.
2. Class schedule and effort expectations: 1 hour lecture and 2 hours recitation per week equals a *minimum* of 6 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. Silence phones and other devices that may interrupt the class.
6. Please, no food or drink in class, except bottled water. Our rooms are usually very crowded and food is messy, distracting, and causes spills that ruin expensive textbooks, valuable notes, and electronic devices.
7. Be respectful and considerate of everyone.

Honesty Policy

All students admitted to the University of Florida have signed a statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others. Failure to adhere to this honor code will result in automatic referral to the Student Conduct Committee.

Students Requiring Accommodations

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 to present to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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 at <https://evaluations.ufl.edu/evals>. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Evaluations are typically open during the last two weeks of the semester, but students will be given specific times when they are open. Summaries of the course evaluation results are available to students at <https://evaluations.ufl.edu/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 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>.

*The syllabus and schedule for this course are subject to change with the intent of improving the course or in the event of extenuating circumstances. Any changes or updates will be posted to the Canvas page.