ME 2202 Syllabus
Dynamics of Rigid Bodies, 3 credits
Fall 2026, Section D

Location

TBD

Recitation

Location/time TBD

Recitations are a 0-credit-hour course with no impact on GPA/tuition. It's there simply as a resource for learning the material better (sign up on Oscar before Drop/Add period ends)

Catalog Description

Kinematics and kinetics of particles and rigid bodies in one, two, and three dimensions. Newton-Euler equations. Work-energy and impulse-momentum principles.

Pre/Co-requisites

COE 2001 Statics (C or better). COE 2001, in turn, requires satisfactory completion of PHYS 2211 and MATH 1552.

Course Objectives (see Course Outcomes for details)

Objective 1: To teach students the basic principles underlying the dynamics of rigid bodies in planar and 3D motion.
Objective 2: To educate students to identify, formulate, and solve engineering problems in rigid body dynamics.
Objective 3: To introduce students to the concepts of work-energy and impulse-momentum for rigid body systems.

Course Topics

Particle motion - kinematics and kinetics
Planar kinematics of rigid bodies
Newton-Euler analysis of planar rigid body systems
Angular velocity in three dimensions
Angular acceleration in three dimensions
Euler angles
Rotation matrices
Angular momentum
Inertia properties
Principal moments and axes of inertia
Euler equations - 3D rotational motion of rigid bodies
Impact - impulse-momentum principles for rigid bodies
Work-energy analysis of conservative and nonconservative rigid body systems

Webpage / Online Participation

Course materials, homework assignments, etc., will be posted to Canvas

Textbook

You should obtain a dynamics textbook. One of the following textbooks is recommended:

- Engineering Mechanics: Dynamics, Meriam, Kraig, and Bolton, 9th edition 2018. (Suggested reading will be assigned from this book)
    - WileyPLUS Textbook: (See Canvas Module "Wiley Textbook Purchase Instructions")
    - Bookstore ISBN 9781119501473 –WileyPLUS one-term access ($66)
    - Bookstore ISBN 9781119724216 - WileyPLUS one-term access + loose leaf text
- An Introduction to Dynamics, McGill and King, 4th edition 2003.

Instructor

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Office Hours: TBD
Office Hours Location: MRDC4109

Graders

TBD

Recitation GTA

TBD

Shell Tutor

TBD

Grading

Homework: 20%
Exam 1: 25%
Exam 2: 25%
Final Exam: 30%

Grading Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 - 69	D
0 - 59	F

Attendance Policy

Class attendance will not be taken. However, active class participation is strongly encouraged and will foster your learning. If you miss class, it is your responsibility to be aware of all materials covered and all announcements made in class.

Course Announcements

Announcements will be regularly posted on Canvas and may contain critical notifications. I highly recommend setting your Canvas Announcement preferences to “NOTIFY ME RIGHT AWAY” to get notified by email.

Exams

- All exams will take place in person in the regular classroom, as scheduled in the Class Schedule.
- All exams will be closed-book and closed-notes. However, you may use one 8.5” x 11” sheet of your own notes (both sides). Calculators are OK.
- All exams will be cumulative of all material covered so far.
- The exams are to be completed individually, with no collaboration of any kind.

Homework Assignments

- Over the course of the semester, there will be approximately 10 homework assignments worth 10 points each.
- Homework assignments will be distributed via PDF files posted to Canvas.
- I strongly encourage you to work the homework problems parametrically, then substitute numbers at the end. This will make it much easier to troubleshoot your solution and will better prepare you for the exams.
- Working in groups is allowed, but each student must turn in their own work (see ***Citing Your Collaboration and References*** section below). The homework assignments are designed to help you learn the material. Experience has shown that if you do not put in sufficient effort or if you are relying too heavily on the aid of others in your study group, it will negatively impact your exam grades.
- All course deliverables must be submitted in Canvas unless otherwise stipulated.
- Any course deliverables submitted as email attachments will be discarded and assigned a grade of 0, unless a justified and documented excuse has been established (see below).
- **All homework submissions must be consolidated into a single PDF file** that contains all hand-written work, computer codes/scripts (if applicable), figures, etc.
- **Students must check their submissions in Canvas and confirm the following:**
    - All deliverables were successfully submitted to the correct assignment
    - All deliverables will open correctly once downloaded for grading
- Detailed assignment feedback will be provided in Canvas. **You are responsible for checking the written comments and/or graphical annotations**.
- Solutions to the homework will be posted to Canvas after the due date has passed; it is your responsibility to review these solutions in detail and to compare them with your returned homework.
- **Your lowest homework grade will be dropped (not counted toward the final grade).**

Notes on late or missing work:

- Assignments are due by the deadline designated for that activity unless otherwise stipulated.
- No individual extensions will be granted without a justified and documented excuse (see below)
- Late assignments without a justified and documented excuse (see below) will receive the following grade penalty:
    - Up to 24 hours late - 25% penalty
    - Up to 48 hours late - 50% penalty
    - More than 48 hours late - no credit given
- For justified and documented excuses (see below), a new due date must be negotiated with the course instructor immediately.

Make-up policy

There will be no make-ups unless absolutely exceptional and fully documented situations arise. If you miss an assignment without a fully documented reason, you get a zero (0) for that assignment.

Definition of a documented excuse

- What **is** a documented excuse: A note from the Dean of Students' office (see ***Student Illness*** below), approved Institute activities letters (section IV.B.3 of the Student Rules and Regulations).
- What is **not** a documented excuse: Student Health Center notes, Counseling Center notes, doctor appointments, family trips, flights, etc.

Midterm Evaluation:

In accordance with Georgia Tech policy for 1000 and 2000-level courses, midterm grades (Satisfactory/Unsatisfactory) will be issued to the Registrar.

Errors and Omissions

All re-grade requests or grade protests must be submitted in writing with an explanation of why the grade should be adjusted **within one week of receiving the grade**. Please provide an explanation for why the assigned scores are incorrect.

Extra Credit

- If available, the extra credit opportunities will be announced along with the maximum extra credit to be received, the due date, and the grading category it will apply to.
- **The maximum grade in any category with extra credit (e.g. Team Project) cannot exceed 100%.**

Getting help (outside of the classroom)

- Your FIRST avenue for getting help should be the instructor and/or GTA office hours. This is the most efficient way to get your questions answered.

- If your schedule does not permit the attendance of the available office hours, or you need an individual meeting for non-homework/exam-related discussions, please e-mail the instructor or GTA to schedule an appointment.
- The “Discussion” feature on the course Canvas site is also a great resource, but should not replace office hours attendance. “Discussions” should be used for clarifications/questions that could benefit all and can be answered without much back and forth. Please reserve questions that require detailed discussions for office hours.
- It is not appropriate to ask the instructor or GTA if your homework solution is correct. Instead, indicate why you think your solution might be incorrect, where you think it might have gone wrong, or where any confusion is coming from, so that we can better help improve your understanding.
- There might be a Shell tutor available for our course. This tutor will not be familiar with your specific assignments, but is a good resource for general questions about the course materials. Please check if a Shell tutor is available this semester and find the associated schedule/location here: https://www.me.gatech.edu/tutoring-0

Review and Supplemental Material

If you would like to have some additional practice with 2D and 3D dynamics, please check out the two Coursera courses created by Dr. Wayne Whiteman. Access them at:
https://www.coursera.org/learn/dynamics
https://www.coursera.org/learn/motion-and-kinetics

Citing Your Collaboration and References

Collaboration is encouraged. Discussing the assignments with your peers will help you to develop a deeper understanding of the material. I encourage you to try to work out the problems separately, then meet in study groups or come to office hours to compare your answers, and to combine forces in trying to solve some of the more difficult problems. However, it is expected that each student will turn in their own work. Do not copy the solution from another student, from electronic documents, from the official solution manual, from online AI chatbots, etc.

You must document any assistance that you received from any person or any reference to complete your homework assignments. For example, if you worked with your friend Joe to get the answer for Problem 1.06 and used the text and worked in a study group to get answers to 1.26, 1.45, and 1.60, you would write the following on your homework cover sheet:

“References: I worked with Joe Smith on 1.06. I worked in a study group with Joe Smith and Jane Schmidt, and referred to Meriam for 1.26, 1.45, 1.60.”

While you can and should work with others as part of a team, the homework assignment you turn in must be your own write-up! You must include references to receive credit for your assignment. Any copying of homework will have severe consequences and will be reported to the Dean of Students.

Academic Dishonesty:

Students are expected to do their own work on all course assignments, including quizzes, exams, etc., except when otherwise assigned by the instructor. Furthermore, do not allow anyone to copy any portion of your notebook, exams, quizzes, sketches, or any computer files you create for this class as a part of any assignment or required project during this course or any time in future semesters after having taken this course. The Georgia Tech Academic Honor Code (http://www.catalog.gatech.edu/policies/honor-code/) will be used as the standard for this class. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, which will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you wish to request an accommodation due to a documented disability, please inform your instructor and contact Disability Services as soon as possible. They can be reached at dsinfo@gatech.edu, http://disabilityservices.gatech.edu/, or 404-894-2563 (voice)/ 404-894-1664 (TDD).

Student Illness

In the event of a medical emergency or an illness that is severe enough to require medical attention, students are responsible for contacting the Office of the Dean of Students as soon as possible to report the medical issue or emergency, providing dated documentation from a medical professional, and requesting assistance in notifying their instructors. The medical documentation will be handled confidentially within the Office of the Dean of Students and will inform a decision as to whether communication with instructional faculty is appropriate. It is the expectation of the Institute that instructional faculty will honor a request from the Office of the Dean of Students to excuse a medical emergency or illness and allow make-up of the work missed, including homework, quizzes, presentations, examinations, or other class assignments.

Mental Health and Wellness

As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, depression, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. GT offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know is experiencing any of the issues noted above, consider using the confidential mental health services available on campus:

- GT CARE (www.care.gatech.edu, 404-894-3498)
- Counseling Center (www.counseling.gatech.edu, 404-894-2575)

Student-Faculty Expectations:

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. Please refer to this catalog page for an articulation of some basic expectations that you can have of me and that

I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Changes

When appropriate or necessary, the instructor may adjust, amend, or otherwise modify the information presented in the syllabus. Changes will be made in a manner to minimize disruption and in the interest of fostering learning. Every effort will be made to ensure that all changes are brought to the attention of students, so as to minimize inconvenience.

Course materials

Woodruff School faculty own the copyright to all course materials created for ME 2202. This includes (but is not limited to) lecture slides, assignments, and project materials. Any such materials provided to you in any form, including those posted on Canvas, are for the exclusive use of students enrolled in the course. Students are not allowed to reproduce, distribute, or publicly post course materials without express written permission from the Woodruff School faculty. In particular, marketing, selling, or reposting any of these documents on any website is strictly forbidden - it constitutes academic misconduct, is a violation of the Georgia Tech Student Code of Conduct (see section D92), and is a copyright violation. If such illicit postings of intellectual property are discovered, these violations will be reported to the Office of Legal Affairs and the Dean of Students.

Course Outcomes

- Outcome 1: Students will learn the basic principles underlying the dynamics of rigid bodies in planar and 3D motion.
    - 1.1 Students will demonstrate an understanding of Newtonian-Eulerian physics and basic equations underlying kinematics and kinetics of rigid bodies in 2D and 3D motion.
- Outcome 2: Students will demonstrate the ability to identify, formulate, and solve engineering problems in rigid body dynamics.
    - 2.1 Students will demonstrate the ability to isolate rigid bodies and to draw clear and appropriate free-body diagrams.
    - 2.2 Students will demonstrate an ability to identify and effectively account for kinematic constraints such as rolling and/or sliding, and their kinetic consequences.
    - 2.3 Students will demonstrate that they can determine the mass moments and products of inertia for arbitrary rigid bodies.
- Outcome 3: Students will demonstrate an understanding of the concepts of work-energy and impulse-momentum for rigid body systems.
    - 3.1 Students will demonstrate an understanding of work-energy principles as applied to rigid bodies in 2D and 3D motion.
    - 3.2 Students will be able to evaluate the kinetic energy of rigid bodies as well as the potential energy associated with gravity and spring forces.
    - 3.3 Students will demonstrate an understanding of conservation laws for momentum and energy.

- 3.4 Students will demonstrate an ability to apply impulse-momentum relations where appropriate.
- 3.5 Students will demonstrate that they can utilize the coefficient of restitution data in the solution of impact problems in rigid-body dynamics.