

Engineering Mechanics - Dynamics

EGM 3401

Academic Term: Spring 2022

Instructor:

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Office Hours: TBD

Teaching Assistants:

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Course Description

Continues the dynamics sequence begun in EGM3400 plus extended coverage of three-dimensional rigid-body dynamics and orbital motion.

Credits: 3

Course Pre-Requisites / Co-Requisites

Pre-requisites: EGM 2511 or EGM 2500
MAC 2313

Engineering Mechanics - Statics
Analytic Geometry and Calculus 3

Course Objectives

To provide a thorough and systematic introduction to the subject of dynamics of particles and rigid bodies using a Newton-Euler approach. To develop a deep understanding of the kinematics of particles and rigid bodies, the kinetics of a particle, the kinetics of a system of particles, and the kinetics of a rigid body. Many examples will provide insight into the underlying physical processes.

Materials and Supply Fees

None

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 | Low |
| 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 | Low |
| 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 |

*Coverage is given as high, medium, or low. An empty box indicates that this outcome significantly addressed by this course.

Required Textbooks and Software

- Title: *Dynamics of Particles and Rigid Bodies: A Systematic Approach*
- Author: Anil Rao
- Publisher and publication date: Cambridge University Press, 2006
- ISBN number: 978-0-521-18790-9

Recommended Reading

- The book. It is dense, but that is because it is thorough. Dr. Rao (the author) also has videos on his YouTube page.

Tentative Course Schedule (Subject to Brooksing)

- Week 1: Scalars, vectors, tensors, matrices (Rao Ch. 1)
- Weeks 2-6: Kinematics of particles and rigid bodies (Rao Ch. 2)
- Weeks 7-10: Kinetics of particles (Rao Ch. 3)
- Weeks 11-13: Kinetics of a system of particles (Rao Ch. 4)
- Weeks 14-16: Kinetics of rigid bodies (Rao Ch. 5)

COVID-19

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated and/or boosted.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance

- All students (and the instructor) are expected to wear masks while in class.
- Regular class "attendance" is expected although not explicitly included in the grade evaluation.
- The course will be delivered in a hybrid format. A Zoom conference will be created for each lecture for students to attend remotely if they do not wish to come to the classroom.

Homework

- HW will be posted on Canvas along with its due date.
- HW will be turned in on Canvas.
- Some problems will be graded for correctness, and other problems will be graded for completion. Completion means a good, honest effort at solving the problem. If you are not sure if you have demonstrated a good, honest effort or not, that means you have not.
- Late HW will be accepted up to 24 hours after the due date with a maximum-grade penalty of 20 points. If you have an absolute doomsday of a week, this is your safety valve. Hardship cases for late HW will be considered on an individual basis and only if the instructor has been contacted before the due date of the assignment. Students with hardship cases (e.g., due to medical problems) will be referred to the Dean of Students office, which will perform a background investigation to determine if the hardship is legitimate.

- If you do not agree with the grading of a HW problem, you will have one week from the date the HW is returned to submit a written argument of why you think the grade should be higher. However, the final decision will remain the instructor's.

Exams and Quizzes

- Quizzes will be shorter assessments focusing on concepts, whereas exams will be longer assessments focusing on solving problems.
- Quizzes will be conducted online via Honorlock. You must have a webcam and be able to rotate the webcam for Honorlock's "Room Scan" to take the exam. Google Chrome and the Honorlock extension for it are also needed.
- Exams will be conducted in-person in the evening.
- Exams will be closed-book and closed notes. The instructor will announce, in class, any allowed formula sheets or resources at least one week before the exam.
- No cell phones or calculators (or any other electronic devices) are allowed during exams.
- Exam problems may be taken directly from the homework problems or from lecture discussions with some modifications. Thus, in addition to the weight placed on homework in the final grade, it is to your advantage to understand as many of the homework problems as possible. The emphasis of the exams will be to test your understanding, not on formulaic repetition, so expect the exam problems to be challenging and to test your grasp of the material taught in the class.
- Makeup exams are only allowed for students with extreme, documented circumstances. Students must contact the instructor as soon as possible to provide documentation and request a make-up exam. Excused absences must be consistent with university policies in the undergraduate catalog and require appropriate documentation (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).
- If you do not agree with the grading of a particular exam problem, you will have one week from the date the exam is returned to submit a written argument of why you think the grade should be higher. However, the final decision will remain the instructor's.

E-learning course web site (Canvas)

- Students are expected to check Canvas on a regular basis for up-to-date course information. This may include changes to the syllabus, homework assignment due dates, and exam schedules.

Syllabus

- The instructor reserves the right to make changes to the syllabus as needed during the course of the semester. Any changes will be announced to the class.

Evaluation of Grades

| Assignment | Percentage of Final Grade |
|--|----------------------------------|
| Homework | 20% |
| Quizzes (Times and dates: TBA) | 20% |
| Midterm Exam 1 (Time and date: TBA) | 20% |
| Midterm Exam 2 (Time and date: TBA) | 20% |
| Final Exam (Time and date: TBA) | 20% |
| | 100% |

Tentative Exam Weeks: February 7th, March 21st, Finals week

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 |
| 00.0–59.9 | E | 0.00 |

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Consent for Audio/Video Recording for Online Lectures

Our class sessions will 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 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.

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://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.

Cheating at the University of Florida is unacceptable and will not be tolerated. While learning together and collaboration in the interest of learning are welcome, cheating and plagiarism are not. You are welcome to work with others to learn, but your work must be your own. If you need help with a problem, do not search for someone else's solution on Chegg. Using solutions such as those on Chegg is an Honor Code violation. Instead, **come to office hours to get help from the TAs or myself!** We are the most direct and Honor Code-approved method of getting help in the class. *Use us!*

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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

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.

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>.