

ASEN 2403-002 Dynamics
Spring 2026

Course Syllabus

Section 002: MWF 12:50pm-1:40pm

1 INSTRUCTOR

Dr Melvin Rafi
Office: AERO N203
Email: melvin.rafi@colorado.edu
Office Hours: See Canvas

3 COURSE WEBSITE

Link to Canvas page: <https://canvas.colorado.edu/courses>

4 TEXTBOOKS

The following textbook is required for this course:

- 1) Bedford, A. and Fowler, F., *Engineering Mechanics: Dynamics*, 6th ed., Pearson, 2024.

5 COURSE DESCRIPTION

This course provides students with essential concepts in dynamics, serving as a prerequisite for advanced courses that build upon these foundational principles, including those focused on the dynamics and control of air and space vehicles.

6 COURSE OVERVIEW

The study of dynamics is a key component of every undergraduate engineering major and is especially relevant to Aerospace Engineering. In the upper division, you will begin taking courses dealing with the dynamics of air and space vehicles, building upon the fundamentals presented in this class. Structures, fluids, controls, and orbital mechanics all have roots in this material, so it is critical that you build this technical base carefully.

In this class, the fundamentals of two-dimensional motion of particles and rigid bodies are presented from both a theoretical and practical point of view. In addition to deriving and using the first principles of dynamics, we will demonstrate and work through problems that are intended to help students develop an intuition or feel for dynamics.

7 COURSE PREREQUISITES/COREQUISITES

Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and ASEN 2401 or MCEN 2023 or CVEN 2121 or GEEN 2851 (all minimum grade C-). Requires corequisites APPM 2360 or MATH 2130 and MATH 3430.

8 CLASS POLICIES

8.1 General Policies on Syllabus and Schedule Changes

Please note that we reserve the right to make changes to the course policies stated in the Syllabus and to the Course Schedule as required throughout the semester. We will give sufficient advance notice of changes via announcements on Canvas and/or during class. The most current Syllabus and Course Schedule will be posted on the course website.

8.2 Class Format

- 1) This class meets in-person three times a week for a total of 2.5 hours of in-class instruction.
- 2) Lectures typically cover the introduction of new theory and concepts, discussions, demonstration of worked examples, in-class participation activities, and other related learning experiences. These instructional modalities seek to provide students with knowledge of course material and to prepare students for completing course evaluations.
- 3) Course evaluations comprise of in-class participation activities, homework assignments, and exams. Students are expected to complete certain evaluations, such as homework assignments, outside of scheduled lecture times. Please see the section titled "Assignments & Grading" below for more information on the evaluations in this course for determining final grades.

8.3 Communication

- 1) **Canvas** – Canvas is the official webpage for this course. All general announcements, assignments, course materials, and grades will be available via Canvas. Please do not use direct messaging via Canvas messages to contact the Instructional Team. Instead, please use Canvas Discussions or email (see notes below).
- 2) **Canvas Discussions** – General questions about assignments, syllabus, class policy, and assessments should be posted on the Discussions page on Canvas.
- 3) **Email** – For this course, email should only be used for questions or concerns regarding individual scheduling conflicts or personal issues. Email should not be used as a primary communication method for general questions about assignments, syllabus, and class policy, etc. Due to large volumes of emails received, emails sent to instructors or TFs on such topics might go unanswered. Instead, students are encouraged to use Canvas Discussions for general questions about assignments, syllabus, class policy, etc.
- 4) **Response Times** – All correspondence to Instructors and TFs will be handled during regular business hours (M-F, 9am-5pm). Please remember not to expect immediate responses to emails or Canvas Discussions messages. Additionally, please do not expect responses to emails outside these hours or during the weekend.

- 5) **Additional Guidelines** – Any medical or University-related needs of absence that are known (i.e. non-emergency related) should be communicated to the Instructor as soon as possible. Whenever possible, any expected impact to assignments/exams should be coordinated with the Instructor ***prior to missing a course deadline, not after.***

8.4 Office Hours and Student Resources

- 1) **Instructor Office Hours** – Please see the Canvas page for the most current Instructor office hours. Students are highly encouraged to make use of office hours to seek additional help and guidance on the course material.
- 2) **Teaching Facilitator Office Hours** – TF office hours for this course will typically be held during Study Hall. Please see the Canvas page for the most current TF office hours.

8.5 Attendance

- 1) Attendance is expected at all scheduled lectures. Students are expected to attend all class sessions in addition to completing all assignments by the specified due dates. Some material covered in lecture may not be in the textbook. Quizzes and exams can cover any and all material disseminated in the course, including lectures and homework.

8.6 Student Expectations and Professional Behavior

- 1) Professional behavior and considerate communication practices are expected at all times. Any questions, comments, or concerns you may have should be respectfully voiced to your peers or the Instructional Team either in-person or via email.
- 2) The university expects a minimum of 300 minutes of out-of-class work per week for a 3-credit hour lecture course (approximately 75 hours total over the semester). Students will be expected to review posted material prior to lecture and to work on related assignments outside of the normal meeting times. For more information, see https://www.colorado.edu/registrar/faculty-staff/curriculum/courses/contact-hours#lecture_lec_-2101.
- 3) We encourage you to schedule adequate time to engage with this course outside of weekly lecture and homework assignments. Your background knowledge, experience, and other variables may require you to spend additional time. Please plan accordingly by scheduling time on your calendar in advance. Several factors influence student academic performance and long-term learning. Active engagement in all course activities (e.g., class participation, readings, homework, assignments, studying, etc.) will contribute to your learning and to success in this course. The Instructional Team is available if you are seeking more information on how to be successful in this course. Your academic advisor is another helpful resource to assist you in meeting the requirements of this course.

9 ASSIGNMENTS & GRADING

The course evaluations and grade weightings for this course are as follows:

Assignment	Weight
In-Class Participation Activities	10%
Homework	20%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Exam 4 (Final Exam)	25%

9.1 Assignments

9.1.1 In-Class Participation Activities

1) There will be several unannounced in-class activities throughout the semester which will count towards participation credit. Students will solve problems in class and will then submit their work individually for participation credit.

2) Policy on Missed In-Class Participation Activities

Please note that ***there will be no due date extensions or make-ups for missed in-class participation activities.*** The lowest 2 in-class participation activity scores will be dropped. A missed in-class participation activity will count as a lowest score.

9.1.2 Homework Assignments

- 1) There will be regularly-assigned homework assignments posted on Canvas.
- 2) For this class, homework assignments will be graded primarily on *completion*. Students are expected and highly encouraged to review the posted solutions to check the *correctness* of their work.
- 3) Each homework assignment should be completed individually. The completed work should be neatly handwritten or typed and submitted via Gradescope as a PDF. It is your responsibility to check your submission before uploading it to Gradescope. ***Submissions that are illegible will not be graded.***
- 4) The problems should be submitted in the same order as in the homework assignment and correctly labeled in Gradescope. ***You must assign pages to each question in your Gradescope submission.***
- 5) Your name (last, first) and assignment number should be visible in the upper portion of each page. Each problem must begin on a new page and be clearly labeled. Final answers should be boxed in.
- 6) To qualify for full credit, each problem should follow the problem-solving method presented in class as follows:
 - a. **Givens:** List and organize all given information. Write the qualitative name of the given variables, along with their algebraic notation.

- b. **Finds:** List all variables that the problem statement asks to find. Write the qualitative name of the required variables, along with their algebraic notation.
- c. **Sketch/Free-Body Diagram:** Where appropriate, a sketch or Free-Body Diagram must be included.
- d. **Solution:** Write out the governing principles or equations required to solve the problem, including any constraint equations. Provide a step-by-step procedure of your solution. Include numerical values and units. Box in your final answer.
- e. **Conclusion/Comments:** If required or specified, provide 1-2 sentences which comment on the reasonableness of your answer. Write down any observations you have regarding your final answer(s).

7) Policy on Missed or Late Homework

Please note that **no homework submissions will be accepted after the assignment due date/time** unless extremely extenuating circumstances prevented timely submission of the homework. This will be considered on a case-by-case basis and is at the sole discretion of the instructor.

Additionally, note that **absolutely no homework submissions will be accepted once solutions to the assignment have been posted**. Homework solutions are typically posted shortly after the homework due date/time.

The lowest 2 homework scores will be dropped. A missed homework will count as a lowest score.

As a reminder, it is your responsibility to complete all assigned homework in a timely manner and to plan for any additional time required to finalize and upload your homework submission via Gradescope.

9.1.3 Exams

- 1) There will be three exams during the semester. Each exam will progressively test your knowledge on all material covered up to that point in the course, since each new topic builds on the previous material. In other words, treat each exam as a comprehensive exam. Exams can cover any and all material disseminated in the course, including lectures and homework
- 2) For this course, exams will be taken in-person during the scheduled lecture time. All exams are to be completed individually. Additional information and instructions will be posted on Canvas prior to the first exam.

3) Policy on Missed Exams

There will be no make-up exams unless extenuating circumstances caused the student to miss the exam. This will be considered on a case-by-case basis at the sole discretion of the instructor.

4) Policy on Accommodations for Exams

Students should expect to receive accommodations for a timed assessment (e.g., exam) only if their faculty instructor(s) receives the student's accommodation letter at least 5 business days before the assessment, as a departmental policy, in order to facilitate administering the assessment.

9.2 General Policies on Late/Missed Assignments

- 1) All assignments and deliverables must be submitted by the specified due date and time.
- 2) Late submissions will not be accepted unless highly extenuating circumstances caused the student to miss the submission deadline. This will be considered on a case-by-case basis at the sole discretion of the instructor.
- 3) Absolutely no submissions will be accepted once solutions to the assignment have been posted.

9.3 Regrade Requests

- 1) Regrade requests must be made via Gradescope within 1 week of the graded assignment being returned (with the exception of the last exam, which might have a shorter regrade window), keeping in mind the points below.
- 2) The purpose of a regrade request is to bring grading errors to the attention of the Instructional Team, and not to request a modification to the grading methodology or rubric. The rubrics are final and cannot be changed or adjusted.
- 3) The regrade request should clearly specify the rubric item where-in the suspected grading error was made. It should also clearly explain, with direct references to the submitted work, why and where the student believes that a grading error was made. In other words, the regrade request should clearly and directly explain why the submitted work should qualify for the stated rubric item.
- 4) Regrade requests submitted without the required information will not be reviewed.

9.4 Final Grade Policies

Assignments are graded to an absolute standard designed to indicate your level of competency in the course material. The final grade indicates your readiness to continue to the next level in the curriculum. The AES faculty have set these standards based on our experience, interactions with industry, government laboratories, others in academe, and according to the criteria established by the ABET accreditation board.

Grades for the course are set based on the following criteria:

- A, A- Demonstrates mastery of the course material in both conceptual and quantitative aspects.
- B+, B Demonstrates comprehensive understanding of the material, with a solid conceptual grasp of key concepts and strong quantitative work.
- B-, C+ Demonstrates good understanding of most key concepts, with few major quantitative errors.
- C Demonstrates satisfactory understanding of the material, with sufficient quantitative work.
- C- Demonstrates adequate understanding of the material to proceed to the next level, quantitative work with some persistent errors.
- D Little understanding is evident, consistently poor quantitative work.
- F Unsatisfactory performance.

10 CU BOULDER SYLLABUS STATEMENTS

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part of adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the Honor Code will be assigned resolution outcomes from Student Conduct & Conflict Resolution and will be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, please contact your Instructor as soon as possible.

Accommodation for Religious Obligations

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. Please communicate the need for a religious accommodation in a timely manner. If you require a religious accommodation, please contact your Instructor as soon as possible. See the [campus policy regarding religious observances](#) for full details.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information does not always align with how they identify. If you wish to have your preferred name (rather than your legal name) and/or your preferred pronouns appear on your instructors' class rosters and in Canvas, visit the [Registrar's website](#) for instructions on how to change your personal information in university systems.

Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy.

Additional classroom behavior information

- [Student Classroom and Course-Related Behavior Policy](#).
- [Student Code of Conduct](#).

- [Office of Institutional Equity and Compliance.](#)
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Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits [protected-class](#) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email OIEC@colorado.edu. Information about university policies, [reporting options](#), and [OIEC support resources](#) including confidential services can be found on the [OIEC website](#).

Please know that faculty and graduate instructors are required to inform OIEC when they are made aware of incidents related to these concerns regardless of when or where something occurred. This is to ensure the person impacted receives outreach from OIEC about resolution options and support resources. To learn more about reporting and support a variety of concerns, visit the [Don't Ignore It page](#).

Mental Health and Wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact [Counseling and Psychiatric Services \(CAPS\)](#), located in C4C, or call (303) 492-2277, 24/7.