

SYLLABUS for ASEN 2403: DYNAMICS - SPRING 2026

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Material is preliminary and subject to change

Instructor Information

Name: Prof. Khosro Ghobadi-Far

Instructor Office Hours: see details on Canvas.

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❖ Course Overview

Course webpage: canvas.colorado.edu

Lectures: Mondays, Wednesdays and Fridays in **AERO 120** from **09:35 to 10:25 AM**

- Lectures will be recorded via classroom capture and automatically posted to Canvas.

Course description:

The study of dynamics is a key component of every undergraduate engineering major and is especially relevant to the Aerospace Engineering Sciences. In the upper division, you will begin taking courses focused on the dynamics of air and space vehicles, building upon the fundamentals presented in this course. Advanced courses such as structures, fluids, controls, and astrodynamics all have roots in this material, so it is critical that you develop a strong technical foundation in dynamics.

In this class, the fundamentals of two-dimensional motion and dynamics of particles and rigid bodies are presented from a theoretical point of view. We will derive all the equations of dynamics starting from basic principles. To deepen understanding of principles of dynamics, we will then provide applications of such principles through a variety of example problems.

Prerequisites: 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.

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Much of the material covered in this class uses concepts from your first-year physics class. It also depends heavily on a solid understanding of statics. Students are expected to have a working knowledge of vector operations and vector calculus. Assignments regularly require the use of MATLAB; students are expected to be proficient in the use of MATLAB for problem-solving.

Course topics: We will cover the following topics in this course:

1. Particle kinematics and dynamics
2. Particle energy and momentum methods
3. Planar rigid body kinematics
4. Planar rigid body dynamics
5. Rigid body energy and momentum methods

❖ Textbook

Required: *Engineering Mechanics: Dynamics*, by Bedford and Fowler, Sixth Edition, 2023.
ISBN VP ISBN-10: 9780138034016

❖ Course Components

Concepts are introduced and student proficiency is evaluated using the following mechanisms:

Textbook and Reading assignments: The primary means for conveying information, techniques, and examples is the textbook and course notes. The textbook is excellent, providing clear explanations and numerous examples of varying difficulty - take advantage of this outstanding resource. Reading assignments are to be completed prior to the class lecture.

Lectures & Discussion: We typically start a new topic in each lecture session. The instructor will provide a complementary overview of the material covered in the reading assignment. You are expected to attend lectures and encouraged to take notes, ask questions, and actively participate in any activities.

In-Class Exercises: In the lecture periods, we will sometimes have problem-solving activities in the form of in-class exercises. A problem will be presented that may require conceptual discussion, problem formulation, diagrams, or technical calculations. Students are encouraged to work in small groups to answer the questions. Then, we discuss the questions and problem solutions in class.

Homeworks: Homework problems are generally assigned once per week. They provide practice in solving problems of varying difficulty and sometimes will also involve computing. Collaboration on homework is allowed, but the students are not allowed to copy the solutions from others. Students are encouraged to use homework to ensure their individual mastery of the subject.

Exams: This course includes a total of four exams. Three midterm exams will be administered in-person at ~4 week intervals; **see Canvas for dates and times of midterm exams**. One final exam is

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comprehensive, covering material from the entire course. These exams may include both conceptual questions and detailed problems similar to homework.

Prior to each exam, the instructor will provide a list of specific exam policies, including the course content to be covered, materials allowed, etc.

Any type of collaboration or copying on an exam or final constitutes cheating and will result in an F for the course. An honor code violation report will be filed.

Note: no opportunities for extra credit will be provided.

❖ Course Policies

Grading errors: If you notice an error in grading of your assignment, you may use the regrade request function in Gradescope to briefly describe the error. Regrade requests for any exam or assignment must be submitted within 1 week of the grade posting to Canvas.

Communication: You may use the Piazza or the optional course Slack page to discuss any technical questions with the instructional team and/or your fellow class members.

However, administrative, student-specific questions or requests may be discussed with the instructor only over email. You must send emails from your CU email address and list “ASEN2403:” at the start of the subject line of your email. The instructor reserves the right to reply to email questions only during business hours, i.e., Monday through Friday, 9:00 am – 5:00 pm. Please note that The instructor cannot respond immediately; They will respond as soon as they are able and according to the time-sensitive nature of the request. Emails received one business day or less before any exams are not guaranteed a response prior to the exam.

Attendance: Lecture attendance is expected but is not required. Attendance for exams is required.

❖ Homework Policies

Homework posting and submission

- Homework assignments will be posted on Canvas with the deadline clearly listed.
- All assignments must be submitted in Gradescope by the deadline.
- You may resubmit or update your homework in Gradescope multiple times before the homework deadline, for instance, if you wish to correct an error. However, you will not be able to resubmit or update your homework after the deadline has passed.
- Once you submit your assignment electronically, please double check that the file has uploaded correctly, is readable and is not corrupted; it is your responsibility to ensure it is uploaded correctly. We will not grade a homework if we cannot open the file.
- Late homework will not be accepted.
- The lowest homework grade across the entire semester will be automatically dropped when calculating final grades.
- Solutions will be posted on Canvas after the deadline has passed.

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Collaboration vs Copying/Plagiarism

- Collaboration is permitted on homework. You may discuss the means and methods for formulating and solving problems and even compare answers, but you may not copy someone's assignment. Copying material from any resource (including solutions manuals) and submitting it as one's own is considered plagiarism and is an Honor Code violation. The more you think about the problems yourself, the more you learn, and the more successful you will be in exams and in subsequent courses.
- Directly copying from a solution manual or other sources is considered plagiarism.

Content

- Homework submissions must demonstrate an understanding of the principles involved by including the following components, where applicable: diagrams, using correct notation and terminology, explaining the approach in a clear and technically precise manner, showing the key steps and intermediate quantities used to obtain the solution, discussion of relevant theory and technical concepts, and outlining the answer with proper units. These components are critical for developing problem-solving and technical communication skills.
- A commented code or script alone is not considered a homework solution unless specifically requested for a problem and will not receive full credit; for credit, a write-up (by hand or typed using word-processing software) with the components described above must accompany the solution to each problem, unless otherwise specified.

Format

- Homework should be neatly handwritten with a new page for each problem. Typed homework is acceptable, if you prefer, but is not required or encouraged. If you write a MATLAB script or function to solve the problems, the code must be included at the end of your submission. Code does not serve as a substitute for working and will not receive full points. You must write out your working and reasoning.
- Always submit work with a professional appearance, i.e., neat, clear, and complete. Messy work that cannot be read will not be graded, receiving a score of zero.
- Vector notation must be used when appropriate. Numerical values must include units and a meaningful number of significant digits. Final answers must be boxed.

Grading

- Homework is graded partially based on completion of assigned problems and partially based on the quality/accuracy of a subset of the assigned problems. To receive credit for completion, problems must be presented using the full appropriate problem-solving approach. The problems graded for accuracy and quality will be evaluated in more detail by looking for a correct technical approach; accurate, clear, and complete working; and accurate answers.

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- In computing the overall homework grade, we will drop the lowest homework grade. This grading scheme provides, for example, some flexibility in dealing with a higher workload in another class or an unexpected situation that prevents you from completing one of the assignments.

❖ Use of AI in this class

Students in this class are NOT allowed to use Generative AI (e.g., ChatGPT) on any assessment in this course. Use of these tools would not enhance your learning in the subject matter covered in this class. Each student is expected to complete each assessment without assistance from AI. Use of AI will be treated as a form of academic dishonesty akin to plagiarism.

❖ Grading Scheme

Assessment	Percentage
Homework (lowest grade will be dropped)	20%
In-Class Exercises	5%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Final Exam	15%

❖ Accommodation

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.

University Policies

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 in 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 the Student Conduct & Conflict Resolution as well as 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 email the instructor as soon as possible to make necessary arrangements.

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. In this class, you must alert the instructors with the need for a religious accommodation during the first two weeks of classes, i.e., by January 24, 2025.

See the [campus policy regarding religious observances](#) for full details.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

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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.

For more information, see the [classroom behavior policy](#), the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

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 CUreport@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 that individuals impacted receive outreach from OIEC about their options and support resources. To learn more about reporting and support for 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.

Free and unlimited telehealth is also available through [Academic Live Care](#). The Academic Live Care site also provides information about additional wellness services on campus that are available to students.