

Syllabus – ASEN 3502: Aerospace Computational Methods

Zachary Sunberg — Fall 2026

Prerequisites

- **Requisites:** Requires prerequisite courses of ASEN 2402, ASEN 2403, APPM 2350, and APPM 2360 (all minimum grade C-).
- **Recommended:** Prerequisites ASEN 2501 and ASEN 2502.

See [the CU catalog](#) for additional information and alternative courses.

Course Learning Objectives

After taking the course, students should be able to:

1. **[Numerical Methods]** Apply and interpret numerical methods for solving computational problems typically encountered in aerospace engineering, including algebraic systems, differential equations, optimization, and regression.
2. **[Problem Formulation]** Formulate aerospace engineering problems as mathematical problems appropriate for computational solution.
3. **[Evaluation]** Evaluate and communicate about the appropriateness of computational methods for a particular task in terms of computational cost, order of accuracy, implementation complexity, and stability.
4. **[Implementation]** Implement algorithms in an efficient and maintainable manner as an individual and as part of a team.
5. **[Self-Learning]** Discover, implement, verify, and apply self-taught computational methods not covered in class.

See the [Schedule](#) for an up-to-date list of topics and the [Course Foundations page](#) for additional information, including the topics, concepts, and skills supporting each outcome.

Course Components

- **Labs:** Labs are the primary formative activity for the class. In the labs, you will work in teams in a semi-realistic setting to prepare you to use computational methods in senior design and beyond. During labs, as in senior design and industry, you may be required to propose solutions to problems that go beyond what is strictly taught in the class.
- **Lectures:** Lectures will introduce the important concepts in the course and engage students through in-class formative assignments. Students will be encouraged to take hand-written notes along with the instructor. Classroom recordings will be made available if students miss lectures.
- **Textbook and Other Materials:** Most of the material in the course is contained in the textbook below. Students are highly encouraged to read the relevant sections of the book as they encounter the material in lectures and lab. Occasionally, the class will go beyond the material in the book and additional resources will be posted on the course website.
- **Homework:** As a supplement to the labs, short individual homeworks will be assigned to build particular skills.
- **Exams:** The primary summative assessment for this course are exams. These will be hand-written and will require a **scientific calculator** (has exponential, sin, cos, log, but not a graphing calculator, e.g. TI-30). Questions may include multiple choice, working out mathematical problems, writing pseudocode or Matlab.

Communication and Websites

- asen3502.com is the course hub — schedule, syllabus, and materials.
- Announcements will be posted on **Canvas**
- All assignments will be submitted on **Gradescope**

- Students should communicate with course staff and post questions on **Slack**. Please ask questions in the appropriate Slack channel rather than emailing the course staff. Email is still OK to use in exceptional circumstances if there is a reason to not post on Slack. The Slack invite link is in a Canvas announcement.

Textbook

Applied Numerical Methods with MATLAB for Engineers and Scientists, 5th Edition, by Steven C. Chapra. Electronic version available at the link in the website menu.

Some of the optimization content will come from *Engineering Design Optimization* by Joaquim R. R. A. Martins and Andrew Ning (Cambridge University Press, 2022), which is available for free at mdobook.github.io.

Attendance and Participation

Learning is a collaborative effort between the instructor and students. Students are expected to attend all lectures and labs (except in cases of illness, important travel, or when specifically noted in a Canvas announcement), ask questions, and participate in discussions. The course staff will encourage attendance through in-class assignments. **If a student needs to miss class occasionally, please do NOT notify the course staff.** Several of the lowest in-class assignment scores will be dropped to accommodate absences (see the grade breakdown below).

Assignments and Grading

Grading Philosophy

Grades are assigned according to an absolute standard designed to indicate your level of competence 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 education, experience, interactions with industry, government laboratories, others in academy, and according to the criteria established by the ABET accreditation board.

The course grade is primarily dependent on individual summative measures of competency, i.e., written exams. In order to receive a passing grade, you must attain a passing weighted average grade on the exams. The additional assignments are both formative and summative and factor into a passing grade with the percentages below.

Grades for the course are earned 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 satisfying understanding of the material with sufficient quantitative work.
- **C-** Demonstrates adequate understanding of the material to proceed to the next level; sufficient quantitative work.
- **D** Very little understanding is evident, consistently poor quantitative work.
- **F** Unsatisfactory performance.

Grade Breakdown

- **60% Exams** (Lowest midterm: 10%, Other midterms: 15%, Final: 20%)
- **25% Labs**
- **7% Homework** (Lowest dropped)
- **8% In-Class Assignments** (Lowest 20% dropped)

In order to receive a C- or better in the class, you must receive a C- or better on the individual summative assessments, i.e. the Exam portion of the grade.

Since this is a new course, this grade breakdown is subject to changes or additions during the semester. Students will be given advance notice of changes.

Late Policy

To ensure proper progression through the course, students are expected to begin assignments early and submit homework and labs on time. However, in order to provide for minor unforeseen events or responsibilities, students may turn in late homework and labs within 72 hours of the due date with a 10% penalty. No homework or labs will be accepted after 72 hours beyond the due date. The lowest homework score will be dropped to account for missed assignments.

AI Policy

See asen3502.com/ai-policy

Instructor

Zachary Sunberg zachary.sunberg@colorado.edu (Please ask questions on Slack when possible.)

Additional 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 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.

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.

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

If you have a temporary illness, injury or required medical isolation for which you require adjustment, please contact the instructor via email. You do not need to state the nature of your illness, and no doctor's note is required.

Accommodation for Religious Obligations

Instructional faculty members must make every reasonable effort to accommodate all students who have conflicts with scheduled exams, assignment deadlines or required attendance due to a religious observance. Whenever

possible, students must notify the instructional faculty member at least two weeks in advance of the expected exam, assignment deadline, or attendance conflict to request an accommodation for religious observance. If the start date of the course is less than two weeks before the date of requested accommodation, students must notify the instructional faculty member on the start date of the course. See the [Student Academic Accommodations for Religious Observances Policy](#) for more information.

In this class, please contact the instructor via email as early as possible, and at least two weeks before the affected exam or deadline where that is possible, so that reasonable arrangements can be made.

Student Names and Pronouns

CU Boulder recognizes that students' legal information does not always align with how they identify. If you wish to have a name other than your legal name appear on your instructors' class rosters and in Canvas, or if you wish to choose pronouns to 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](#).

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering a productive 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- or off-campus. Denial of an approved accommodation for disability, religious observance, or pregnancy or pregnancy related medical conditions may be discriminatory.

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, [OIEC reporting options](#), and [OIEC support resources](#) including confidential services can be found on the OIEC website.

Faculty and graduate instructors are required to inform OIEC when someone discloses misconduct regardless of when or where it occurred. This is to ensure that those impacted receive outreach from OIEC about resolution options and support resources. To learn more about reporting and support options for a variety of concerns, visit the [Don't Ignore It](#) page.

Mental Health and Wellness

The University of Colorado Boulder is committed to supporting students' mental health and overall wellbeing. If personal, academic, or emotional challenges are affecting your wellbeing or success, [Counseling and Psychiatric Services \(CAPS\)](#) is here to help. CAPS offers counseling, referrals, psychiatric care, crisis support, and much more. Visit CAPS in the C4C, or call (303) 492-2277, 24/7.