Syllabus

ASEN 3501: Aerospace Experimental Methods

Course Syllabus

Fall 2026 | University of Colorado Boulder

Contact Information

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Instructor Bio

Bobby Hodgkinson, Associate Teaching Professor, Smead Aerospace Engineering Sciences

Hi everyone. I'm Bobby Hodgkinson, and I'll be your instructor for this course. My background is in vehicle controls, with experience working on unmanned aerial systems (UAS) and underwater vehicles, where I've tackled challenges in dynamic modeling, system stability, automation, sensors, and actuators. I'm passionate about applying dynamics and controls principles to real-world aerospace problems and helping students bridge the gap between theory and practice. That is exactly what this course is designed to do.

Outside of engineering, I'm interested in the intersection of AI and education. I serve on the executive board of the Rocky Mountain AI Interest Group, a regional non-profit focused on exploring and promoting the ethical use of AI in our community. ASEN 3501 will engage with AI directly, not as a subject of study, but as a professional reality that shapes how I've designed the course, the assessments, and the expectations for your work.

About the Course

Course Description

ASEN 3501 develops the skills required to design, execute, and critically evaluate aerospace experiments with engineering discipline. The overarching goal is to train test engineers: professionals who design tests, characterize systems, and validate models for engineering organizations. The course is organized around a single question that opens Week 1 and closes Week 15: *How do you know this prediction is right?* Students work through three progressively demanding segments: executing experiments they are given (E1: Weeks 1–5), predicting before measuring in complex aerospace systems (E2: Weeks 6–10), and designing their own experiments from scratch (E3: Weeks 11–15). The Aerospace Modeling & Validation Framework (AMVF) provides the organizing structure throughout. By the end of the course, students are not just able to run an experiment and report a number; they can justify belief in a result, quantify what they don't know, and design experiments that support credible engineering decisions. This is the physical modeling branch of the curriculum, where mathematical models connect with the physical world.

Course Learning Outcomes

By the end of this course, students will be able to:

CLO 1. **Design and conduct** aerospace experiments by applying measurement fundamentals, instrumentation principles, and best practices in small team environments.

CLO 2. **Apply** statistical methods and uncertainty analysis to quantify experimental error and establish confidence in results.

CLO 3. **Integrate** theoretical models with experimental data to validate and evaluate aerospace system behavior.

CLO 4. **Implement** signal conditioning, sampling, and data acquisition techniques to ensure accurate experimental measurements.

CLO 5. **Communicate** experimental results effectively through technical reports and presentations, with clear description of methods, results, and limitations.

CLO 6. **Identify, evaluate, and create** experimental methods or instrumentation beyond those provided by the instructor to foster independent professional growth.

Prerequisites

Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 & MATH 3430 (all minimum grade C-) or instructor approval. Students are expected to have prior exposure to MATLAB and to the fundamental mathematics required to interpret physical models (calculus, basic linear algebra, introductory physics). No prior laboratory methods experience is required.

Required Materials

- **No required textbook.** There is no textbook for this course. Instead, open educational resources and other course materials will be linked as appropriate through Canvas and related course materials.
- **Supplementary reference:** Coleman & Steele, *Experimentation, Validation, and Uncertainty Analysis for Engineers*, 4th edition. It is available through **CU Libraries** [redacted]d on reserve. Specific chapters will be assigned as the course progresses.
- **MATLAB** is the primary recommended computing platform for all labs and assignments. It is available at no cost through CU Boulder's license; installation instructions are on Canvas. Students who prefer to use Python (NumPy, SciPy, matplotlib) or another platform may do so, but **the teaching team will prioritize assistance for MATLAB first and foremost**.

Students using other platforms are responsible for translating any provided MATLAB code, functions, or toolbox references on their own. No special accommodation will be made for non-MATLAB workflows during lab sessions or office hours.

- **Project supplies:** Students may choose to purchase supplies for project activities, but no purchase is required. The approach is similar to first-year projects. If you want to run your chosen experiment with your own materials, that is encouraged but not required. Students are encouraged to **keep any components they acquire** during course activities, such as sensors, microcontrollers, breadboards, or other hardware, because these may be useful in future senior design projects.

Communication

Canvas is the primary channel for course-wide announcements. Enable your Canvas notifications so you do not miss time-sensitive information.

Email is appropriate for individual coordination, emergencies, and course-related concerns that should not be discussed publicly. Include "ASEN 3501" in the subject line. Responses will be provided within 48 hours during business hours (Monday–Friday, 8:00 am–5:00 pm). If you have not received a response within 2 business days, a follow-up email is appropriate.

In the event of a medical or family emergency, contact the Office of Student Support and Case Management at https://www.colorado.edu/studentaffairs/sscm. They will help coordinate across all of your courses and connect you with campus resources.

Method of Instruction

ASEN 3501 is an in-person laboratory-centric course. Sessions include lectures, hands-on lab activities, in-class discussions, oral assessments, and peer review exercises. The course is organized into three segments of five weeks each:

- **E1 (Weeks 1–5):** Phase I: Execution & Quantification
- **E2 (Weeks 6–10):** Phase II: Predictive Modeling & Comparative Validation
- **E3 (Weeks 11–15):** Phase III: Experimental Design & V&V Planning

Some assigned content, including readings, reference standards, and tutorial materials, will be completed outside of class to maximize in-person time for labs, discussions, and oral assessments. Canvas is the primary platform for all materials, assignment submission, and course communication.

The course schedule identifies lab phases and transition weeks by color. In phased transition weeks, some students will be completing interviews or presentations during scheduled lab time while everyone is also expected to familiarize themselves with the next lab activity and begin any released preparation work independently outside class. This is intentional: the in-class time is reserved for assessment and feedback, while the next lab ramps up through individual preparation before the next full lab meeting.

Attendance is expected. In-person sessions are the primary learning environment. Oral assessments, comparative analysis exercises, and peer evaluations normally happen in class. If a makeup is needed, email the instructor to coordinate the time and place and include **five different available options during normal business hours (Monday–Friday, 8:00 am–5:00 pm)**. A makeup is not confirmed until the instructor replies with an approved option.

Student Responsibilities and Expectations

Credit Hour Expectations

ASEN 3501 is a 3-credit course consisting of 1 credit of lecture and 2 credits of laboratory. A useful planning rule for a 3-credit course is approximately **9 hours of total student effort per week**. In ASEN 3501, roughly 1 hour is lecture and roughly 4 hours are scheduled lab time, so students should plan for approximately **4 additional hours per week** outside scheduled class meetings.

A typical week should include approximately 2–3 hours of lecture preparation, including primer videos, assigned readings, and notes or questions for class. The remaining 1–2 hours should normally support lab preparation, analysis, and assignment completion. This balance will shift across the semester. When a new lab begins, expect more out-of-class time to go toward reading the lab, attempting to understand the procedure, identifying assumptions, and arriving with questions. During the middle of a lab cycle, more work will happen during scheduled lab periods, so more outside time can shift back to lecture preparation. Near lab deadlines, expect the balance to shift again toward analysis and final deliverables.

The course has been intentionally designed around this rhythm, but it will not be perfect every week. Some weeks will require somewhat more time and some somewhat less. Each assignment and lab document will include an estimated time to complete to help you plan accordingly. Students who are consistently exceeding these estimates should contact the instructor.

Preparation

Review assigned readings, reference materials, and any pre-class viewings before each session. Lab documents will be posted in advance, and you are expected to have read them before the lab begins. Arriving unprepared to a lab session reduces your own learning and slows your team.

This is not a fill-in-the-blank laboratory course. Many assignments require engineering judgment: deciding what information matters, choosing a defensible analysis path, interpreting uncertainty, and justifying the reported result. In many cases, more than one answer may be defensible if the reasoning, evidence, and limitations are clearly explained. Even in the first lab, where the governing equation is the simple relationship (P = IV), different students may report different defensible values for power because they made different measurement and uncertainty decisions. The justification for the reported value is central to the assessment.

Asking for Technical Feedback

At some point this semester you will ask a teammate, a TA, or the instructor to look at your work. How you do that matters.

Engineers do not ask only, "Is this right?" They say: *"I'm trying to do X. Here's my approach, and here's why I think it's correct. The parts I'm least confident in are Y and Z."* That framing is more than a courtesy; it is a professional discipline. It tells the reviewer exactly what to look for, demonstrates that you have thought critically about your own work, and makes the feedback you receive far more useful.

Coming to a review without that preparation wastes everyone's time, including yours. Practice this habit starting in Week 1. By the time you reach your E3 oral defense, it should be automatic.

Engagement and Attendance

Active participation is expected in every session. This is not a course where you can recover missed content by watching a recording; lab activities, oral assessments, and comparative analysis exercises are conducted in person. Attendance is not formally taken, but participation is monitored and is a graded component. To request a makeup for a missed in-person assessment, email the instructor and propose **five different options during normal business hours** for an equivalent time-and-place arrangement. Failure to complete either the scheduled assessment or the coordinated makeup may result in no credit.

Course and University Policies

Generative AI (AI Usage Policy)

This policy applies to ASEN 3501. It is not a department or university policy.

The short version: AI usage is encouraged. The course is designed around that assumption. The assessments are designed to reveal real understanding regardless of how content was produced.

The full version:

We are at a point in engineering practice where AI tools can generate a lab report, a data analysis, a literature review, or a slide deck in a fraction of the time it would have taken a person. That is not a problem to resist; it is a fact to prepare for. The workload expectations in this course assume that you are using AI augmentation in your work. If you are not using it, you should be. Knowing how to work effectively with AI tools is part of what it means to be a well-prepared engineer right now, and that bar will only rise.

Here is what follows from that premise:

Creation is cheap. AI can produce a technically plausible lab report with appropriately structured sections, populated figures, and reasonable-sounding conclusions. That means the ability to *produce* a report is no longer an adequate demonstration of understanding. What AI cannot do, at least not without a human who deeply understands the domain, is tell you *what is right, what is wrong, what is missing, and how to make it better.* That critical evaluation skill is what this course is designed to develop. It is also what engineering employers are increasingly paying for.

The primary assessment mechanism in this course is critical evaluation of engineering content, not simply the production of that content. You will frequently be given a report, a data analysis, or a presentation produced by AI, by me, by a peer, or by a prior student. Your grade will depend on the quality of your technical critique. What is correct and well-supported? What is incorrect or unsupported? What is missing? What specific change would most improve it? Answering these questions well requires real understanding that cannot be faked.

Authentic assessments counterbalance AI use in three ways: 1. **In-person oral assessments.** You will explain your work, your choices, and your reasoning to a member of the instructional team in person, without notes or preparation time. You cannot delegate this to AI. Everyone who passes this course will have clearly articulated an understanding of the key fundamentals multiple times, to multiple people, in multiple ways. 2. **In-class comparative analysis exercises.** These are closed-book, in-person exercises where you evaluate provided content. You cannot use external tools. Your grade depends on the technical accuracy and depth of your critique. 3. **The E3 oral defense.** You will defend your own experimental design to a technical audience and respond to direct questions about every decision you made.

What this is not: This is not a policy against AI, and it is not designed to catch or punish AI use. It is a policy that acknowledges the professional reality you are entering and prepares you for it. Using AI to help draft, analyze, refine, or audit your work is permitted and encouraged. The course even includes an early viewing assignment on AI literacy. The expectation is that you use these tools intelligently and that you take responsibility for everything you submit.

Student use of AI: Students will not be required to use AI to complete this course. However, students are strongly encouraged to use AI tools where helpful and appropriate within the guidance of the course content, assignment instructions, and learning objectives.

Transparency: If AI tools substantially contributed to a submission, note it briefly at the end. Describe what tool you used and what you used it for. This is not a disclosure requirement designed to penalize you; it is professional practice.

What is not acceptable: - Submitting AI-generated content as your own without engagement or modification - Using AI to fabricate data, measurements, or results - Using any external tool during closed-book, in-class assessments

Students with concerns about this approach are welcome to discuss them with the instructor. The goal is to prepare you for tomorrow, not to argue about whether tomorrow is coming.

The instructional team may use AI tools to aid in feedback generation and to gain insight into student progress. We will never use AI to produce numerical scores on summative assignments. AI-augmented feedback will always be reviewed and revised by a human before it reaches you.

Instructional Team Use of AI

The instructional team may use generative AI tools in accordance with FERPA and CU guidance to support course development, course administration, assessment workflows, identification of class-level trends, and the generation of formative or personalized feedback. These tools may help us improve the clarity of assignments, refine rubrics, identify common points of confusion, and provide more timely feedback to students.

Why we use it: The goals of AI use on the instructional side mirror what we want you to develop on the student side. We use it to improve the overall quality of the educational product, to reduce the turnaround time between your submission and meaningful feedback, and to increase the level of personalization we can bring to this course. A course of this size, with oral assessments and written deliverables across fifteen weeks, generates more feedback load than a traditional lecture-only course. AI helps us keep feedback timely and substantive rather than generic and delayed.

Generative AI platforms including OpenAI ChatGPT, Anthropic Claude, and Google Gemini were used to aid in the creation of this course content. Images used in the course were generated primarily with OpenAI ChatGPT. The combination of open educational resources and generative AI is intended to support a high-quality, relatively low-cost, and efficient learning experience for you.

Current and anticipated use cases include:

- **AI-augmented grading and feedback.** Rubric-based assessment of course deliverables may be supported by AI tools to generate a first-pass evaluation. That draft is always reviewed, revised, and approved by a human member of the instructional team before it reaches you. AI will never independently determine a student's grade, pass/fail status, rubric outcome, interview result, or numerical score on a summative assignment; a human makes those decisions every time.
- **Content creation and course development.** Lecture materials, assignment documents, readings, and supplemental resources in this course were developed with AI assistance. The instructor has verified and revised all content before it was included in the course. If you find something that looks wrong, flag it. The editorial standard applies regardless of how content was produced.
- **Personalized feedback and student-specific communication.** AI tools may be used to help the instructional team craft feedback that is more specific to your work and your progress in the course, rather than relying on generic comment banks.

- **Assessment design and calibration.** AI may be used to generate sample responses at different quality levels for rubric calibration, or to produce the AI-generated content used in comparative analysis exercises.

What we will not do: We will not use AI to replace human judgment on consequential decisions, including grades, academic integrity determinations, or pass/fail calls on any assessment. When AI-generated observations or feedback are used in relation to student work, they will be reviewed by a member of the instructional team before being returned to students unless explicitly stated otherwise.

Opt-In AI-Assisted Personalized Feedback

Some assignments in this course may offer the option to receive AI-assisted personalized feedback. This may include feedback on concept responses, lab work, written explanations, reflections, or other submitted work.

The use of external generative AI systems to provide personalized feedback on an individual student's submitted work is considered "opt-in". When an assignment includes this option, students will be asked to explicitly indicate their consent, typically by selecting a checkbox associated with the assignment or submission.

If you opt in, your submission will be de-identified before being sent to an external AI system for inference, consistent with applicable privacy practices and FERPA-related guidance. The AI system may be used to analyze your work and help generate timely, personalized feedback. AI-generated feedback or observations will be reviewed by a member of the instructional team before being used or returned to you unless explicitly stated otherwise.

If an external AI system is used for inference, the course will use systems or agreements intended to prevent submitted content from being used to train commercial models, to the best of our ability.

If you do not opt in, your submission will not be sent to an external AI system for individualized AI-assisted feedback. Feedback will instead be generated through the instructional team's human-centric review process and may be subject to the time, staffing, and feedback constraints of the teaching team using that workflow.

Choosing not to participate in AI-assisted feedback will not negatively affect your grade or standing in the course. Likewise, choosing to participate in AI-assisted feedback will not, by itself, positively affect your grade or standing in the course. The opt-in process affects the mechanism used to help generate feedback, not the academic expectations, grading standards, or rubrics applied to your work.

Note on AI-Supported Feedback

The AI-assisted feedback process in this course is intended to support timely, useful, scalable, and personalized feedback. Specific implementation details may evolve during the semester as the instructional team evaluates the workflow, addresses technical issues, and responds to student and teaching team feedback.

Any changes to the process will preserve the core commitments described above: individualized feedback using external AI systems will remain opt-in, student work will be handled according to applicable privacy and compliance practices, and all grading decisions will remain the responsibility of the instructional team.

Want to know more? The instructor welcomes any and all discussion related to these topics as they relate both to this course and to the bigger picture. If you have questions about how AI is being used in grading, content generation, feedback, course design, or any other part of the course, ask. There is no part of this that is meant to be opaque.

Lab Environment Policy

Safety is the first priority in every lab session. Anyone violating safe conduct may receive a zero for that lab and may lose access to lab facilities. Use of lab facilities is a privilege. Failure to wear required safety gear will result in a 10% grade penalty per infraction. Endangering yourself, others, or lab equipment is not acceptable under any circumstances.

Professional behavior and respectful communication are expected at all times. Eating and drinking inside the laboratory is prohibited.

Lecture Recording Notice

Lectures may be recorded for educational purposes. Students who do not wish to appear in recordings must notify the instructor at least 72 hours in advance.

Assignments and Grading

Submission Policies

Platform: Assignments must be submitted via Canvas unless otherwise stated. Submissions must include the names of all contributing members. **Individuals whose name does not appear on a group submission will not receive credit for the assignment. Groups are encouraged to leave off the names of individuals who did not contribute to the lab assignment.**

File format: Follow the file format requirements specified in each assignment. Submissions that do not follow the required format may not be accepted.

Late work: Late submissions will not be accepted without prior approval or a documented emergency. Extension requests must be submitted at least 24 hours before the due date.

Weekly timesheets: Students will submit weekly timesheets in Canvas. Timesheets are part of the professional record for the course: they document how students are allocating effort across preparation, lab work, analysis, teamwork, and revision. They also help the instructional team identify workload problems early enough to respond.

Regular in-class concept check-ins: The instructional team may use short concept check-ins during lecture and/or lab at the team's discretion. These will usually take the form of short-answer responses to questions in Canvas. Bring a device that can access Canvas to every course meeting, or at minimum bring pen and paper so that an impromptu written submission can be collected.

Regrade policy: If you would like to submit a regrade request for any assignment, you must submit the request via email to the instructor within **2 weeks** of the graded assignment return date. All regrade requests will be reviewed and approved by a course instructor, not by teaching assistants, teaching fellows, or lab assistants.

a. The regrade request must clearly state the reason you are requesting the regrade and what you believe the correct grade to be. Note that disagreement on the established rubric is not a valid reason for a regrade and will not be considered.
b. The regrade request must include, in a single combined PDF: an introductory statement addressing the above, a PDF copy of the original submission with portions highlighted that pertain to the regrade request, and any additional supporting information.
c. **Score may be increased or decreased** based on correctness. If a mistake was made in grading, the regrade request may increase the final score; however, if the instructor finds a mistake was made in grading and the score was too high, the regrade request may lower the final score.
d. Regrades submitted in the **final month** of the course will only be entertained if the regrade alters an individual's final letter grade.

We reserve the right to make changes to the course schedule based on emerging circumstances. Advance notice will be provided through Canvas announcements. The current syllabus and schedule will always be posted on Canvas.

Assessment Philosophy

This course assesses two distinct capabilities: the ability to *produce* experimental engineering work, and the ability to *critically evaluate* it. Both are graded. In some assessments, the critique grade is weighted equally to or more heavily than the production grade.

This is intentional. As AI tools become more capable of producing technically plausible content, the engineering skill that retains and increases in value is the ability to evaluate whether that content is correct, complete, and fit for purpose. The comparative analysis exercises in this course, where you evaluate provided reports, analyses, and presentations on technical merit, are not supplementary activities. They are the primary assessment mechanism.

Every student who passes ASEN 3501 will have:

- Produced structured experimental work across all three course segments
- Critically evaluated provided content (AI-generated, instructor-selected, or peer-produced) in multiple in-class exercises
- Articulated their understanding of key fundamentals in multiple in-person oral assessments, to multiple people and in multiple ways
- Defended an original experimental design in a formal oral presentation (E3)

Formative assessments are frequent and low-stakes. The purpose of formative feedback is to show you where you are relative to expectations and to help you develop, not to produce a grade. Take them seriously. Students who engage with formative feedback consistently outperform those who treat it as overhead.

The final third of the course (E3, Weeks 11–15) is driven by you. You choose your experimental design direction. You select your instrumentation. You define the validation logic. The instructor's role shifts from source of knowledge to critical reviewer.

Grading Structure

This course uses a **CLO-based mastery grading system** focused on demonstrated understanding, professional discipline, and the ability to make defensible engineering claims. Your grade is not determined by accumulating points. Your grade is determined by the evidence that you can meet the six Course Learning Outcomes (CLOs), and by the level at which you demonstrate those outcomes.

Each major assessment produces evidence toward one or more CLOs. Evidence may come from lab reports, prediction memos, design documents, oral assessments, presentations, in-class comparative analysis exercises, peer review, the final project, and individually attributable portions of team work. The course Assessment-to-CLO map shows how major assignments connect to the CLOs.

Performance Levels

Level of proficiency

Level	Meaning
Attempted	Relevant work has been submitted, but the evidence is not yet on track toward full proficiency.
Developing	Evidence is on track, but full proficiency has not yet been demonstrated.
Proficient	Full proficiency has been demonstrated at an acceptable level.
Mastery	Full proficiency has been demonstrated consistently, clearly, independently, and with strong engineering judgment.

Once you demonstrate proficiency in a CLO, that proficiency evidence remains part of your record. A later weak performance does not automatically erase prior proficiency. Mastery is different: mastery must be demonstrated consistently, and later work must continue to support the case that you are operating at that level.

Core Assessment Pass Requirement

To pass ASEN 3501, students must satisfy **both** of the following requirements:

1. **Pass every core assessment.** Core assessments include the major laboratory assignments and in-class exam or comparative analysis assessments identified in Canvas as **pass-required**. To pass a core assessment, the associated CLO evidence must be rated at least **Developing** in every required CLO area. In other words, the work must demonstrate that the student is on track, with no required CLO area remaining at the **Attempted** level.

This requirement is separate from the determination of full proficiency or mastery across the course. Later evidence may strengthen a student's overall CLO record, but it does not replace the requirement to meaningfully engage with and pass each core assessment.

1. **Demonstrate full proficiency in all six Course Learning Outcomes (CLOs).** By the end of the course, students must have sufficient evidence to demonstrate full proficiency in each of the six CLOs.

Both requirements must be met to earn a passing grade in the course.

Letter Grade Interpretation

Grade ranges

Grade range	Interpretation
C-range	Full proficiency has been demonstrated in all six CLOs, and all core assessments have received a pass. This is the minimum standard for passing the course.
B-range	Full proficiency has been demonstrated in all six CLOs, all core assessments have received a pass, and there is mastery evidence in some CLOs with generally strong professional performance.
A-range	Full proficiency has been demonstrated in all six CLOs, all core assessments have received a pass, and there is broad, sustained mastery evidence with strong integrative performance, especially in culminating work.

Intermediate grades (C+, B-, B, B+, A-) will be assigned based on the full pattern of evidence across the semester. A grade of A represents superior/excellent performance. A grade of B represents good/better-than-average performance. A grade of C represents competent/average performance, consistent with CU Boulder grading policy.

Final Project Eligibility Rule

To be eligible for a B- or higher final grade, you must have passed all preceeding assignments **before the final presentation window begins**.

Final Exam Period

The final exam period is reserved for students who have not demonstrated full proficiency in all six CLOs after the final presentations. Students who have demonstrated full proficiency prior to the final exam will not need to take the final exam. For this section's meeting pattern, the scheduled final exam period is **Wednesday, December 9, 7:30-10:00 pm** for classes meeting **MWF 9:35 am**.

Instructor Discretion

The instructor will use professional judgment when assigning final grades. This discretion is evidence-based, not extra credit and not subjective preference. It may be used to raise a student's final grade when the full body of evidence shows stronger mastery, growth, professionalism, and engagement. It may also be used to limit mastery-based grade elevation when later work no longer supports previously earned mastery.

Participation is part of that professional evidence. Attendance, preparation, weekly timesheets, in-class concept check-ins, lab engagement, peer support, and constructive participation all help establish how consistently a student has engaged with the course. The instructional team will always entertain requests for help, clarification, feedback, grading mistakes, and learning support regardless of a student's participation record. Requests for any upward grade alteration are different: the likelihood that the instructor will entertain such a request is equal to the student's participation percentage. This does not determine the size of the adjustment or guarantee an adjustment; it determines whether there is enough professional engagement evidence for the request to warrant consideration.

For example, a student who demonstrates mastery early and then disengages or performs poorly on the final project may not retain an A-level grade, even if earlier evidence was strong. A student who demonstrates proficiency across all CLOs before the final project, engages seriously with feedback, and then produces an excellent final project may earn a substantially higher final grade because the culminating work demonstrates integration and mastery. A student who has not demonstrated proficiency across all CLOs before the final project may still recover to a passing C-range grade, but is not eligible for B- or higher.

Because this course includes substantial team-based work, group submissions alone are not sufficient evidence of individual proficiency or mastery. Individual evidence may be collected through oral assessments, individual memos, in-class critique tasks, direct questioning during presentations, peer evaluations, or individually attributable portions of group submissions.

Assessment Types

Lab Reports

Structured written deliverables produced after lab activities. Required sections are specified in each assignment and evolve in complexity across the three course segments. All lab reports require (MATLAB) figures with captions that explicitly state the analytical conclusion. MATLAB is the recommended analysis tool throughout. Lab reports will designate a portion of the grade to peer evaluation. The rubric for each assignment will make these dimensions explicit.

Oral Assessments

In-person, in-lab assessments in which you explain your work, your methods, and your reasoning to a member of the instructional team. These assessments cannot be substituted or made up without a documented emergency. Exceptions require documented circumstances and prior coordination. Oral assessments are scheduled throughout the semester. They are not surprise evaluations; you will know when they are coming and what they will cover.

The purpose is to ensure that demonstrated understanding is real, not performed. Every student who passes this course will have articulated their understanding of the key fundamentals multiple times, to multiple people, in multiple ways.

In-Class Comparative Analysis Exercises

Closed-book, in-person assessments in which you evaluate a provided report, data analysis, or presentation. The content being evaluated may be AI-generated, instructor-produced, or drawn from prior course iterations or professional literature. Your grade depends on the technical quality of your critique: what is correct and well-supported, what is incorrect or unsupported, what is missing, and what specific improvement would most strengthen the work.

Weekly Timesheets

Brief weekly Canvas submissions documenting how course effort was spent. Timesheets are used to support workload calibration, student reflection, and the professional engagement record considered in instructor discretion.

Concept Check-Ins

Short-answer responses used during lecture and/or lab at instructional team discretion. These check-ins are intended to make thinking visible, support timely feedback, and document active participation in the course.

Lightning Talks and Peer Presentations

Short in-class presentations in which you present experimental results, predictions, or design decisions to the class. Graded on clarity, technical accuracy, and the quality of responses to peer questions. Students also evaluate each other's lightning talks using structured written forms.

Peer Evaluation

Structured written evaluation of peers' work, including presentations, and experimental reports. Graded on the quality of the critique: specificity, accuracy of technical assessment, tone, and actionability of improvement recommendations. A vague or uniformly positive peer evaluation will not receive full credit. The source of the work being evaluated (peer, AI, or professional) does not change the standard.

Design Project

The capstone of the course, spanning the final third of the course. You design an original aerospace experiment from scratch: define a predictive model and hypothesis, select sensors and DAQ configuration, specify signal conditioning strategy, produce a MATLAB-based uncertainty analysis, write a full V&V plan, and defend your design in a formal oral presentation. **Optional:** You may record a brief video presentation of your experiment using a private, unlisted YouTube link that is accessible only to those with the URL. This is not a graded requirement. It is an opportunity to build a professional work sample that can be shared through the instructor's network if you choose. If recording presents a concern, notify the instructor and an alternative will be arranged. This project spans the entire final project segment; it is not a single assignment.

Required Statements

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the **Honor Code** (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct) . 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** (mailto: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** (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct) for more information on the academic integrity policy.

AI usage is explicitly permitted and encouraged per the AI Usage Policy above. However, students are fully responsible for the accuracy, integrity, and completeness of everything they submit. Using AI to produce plausible content and submitting it without understanding or verification is a failure of academic integrity because it misrepresents your understanding. Submitting AI-generated content without engagement, fabricating data or results, or failing to disclose substantial AI contributions where disclosure is required may result in academic penalties under the Honor Code.

If you are unsure whether a specific use of AI is acceptable in a given context, ask the instructor before submitting. The standard is straightforward: would you be able to explain every claim, every number, and every decision in your submission if asked in person?

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** (https://www.colorado.edu/disabilityservices/) . Contact Disability Services at 303-492-8671 or **DSinfo@colorado.edu** (mailto:DSinfo@colorado.edu) for further assistance. If you have a temporary medical condition, see **Temporary Medical Conditions** (https://www.colorado.edu/disabilityservices/students/temporary-medical-conditions) on the Disability Services website.

As a departmental policy, students should expect to receive accommodations for a timed assessment, such as an exam, only if the faculty instructor receives the student's accommodation letter at least **5 business days before the assessment**. This advance notice is required so the course team can make the necessary arrangements to administer the assessment appropriately.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, notification of absence is required only for in-person summative assessments. If an absence occurs, notify the instructor in a timely manner to coordinate the time and place and include five different available options during normal business hours (Monday-Friday, 8:00 am-5:00 pm). The instructor reserves the discretion to treat absences on a case-by-case basis. The final exam period is reserved for students who have not demonstrated full proficiency in all six CLOs after the final presentations. An absence during the final exam period will not be given a make-up attempt except for an extenuating unavoidable circumstance.

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** (https://www.colorado.edu/compliance/student-academic-accommodations-religious-observances-policy) for more information.

In this class, students with a major assessment that conflicts with a religious obligation may make a first attempt at that assessment before the conflict. If the student does not elect to make an early attempt, the absence will be treated as any other absence with the same expectations: notify the instructor in a timely manner to coordinate the time and place and include five different available options during normal business hours (Monday-Friday, 8:00 am-5:00 pm). The instructor reserves the discretion to treat absences on a case-by-case basis.

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** (https://www.colorado.edu/registrar/students/records/info/preferred) 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 (https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior) .

Student Code of Conduct (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct) .

Office of Institutional Equity and Compliance (https://www.colorado.edu/oiec/) .

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** (https://www.colorado.edu/oiec/policies/protected-class-nondiscrimination-policy/protected-class-definitions) 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)** (https://www.colorado.edu/oiec/) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email **OIEC@colorado.edu** (mailto:OIEC@colorado.edu) . Information about university policies, **OIEC reporting options** (https://www.colorado.edu/oiec/reporting-resolutions/making-report) , and **OIEC support resources** (https://www.colorado.edu/oiec/support-resources) including confidential services can be found on the **OIEC website** (https://www.colorado.edu/oiec/) .

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** (https://www.colorado.edu/dontignoreit/) .

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) (https://www.colorado.edu/counseling/)** , 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.

Campus Resources

Your success matters beyond this course. If you are experiencing academic, personal, or other challenges, please use these resources:

- **Student Support and Case Management:** https://www.colorado.edu/studentaffairs/sscm for emergencies, complex personal situations, and coordination across multiple courses.
- **Counseling and Psychiatric Services (CAPS):** https://www.colorado.edu/counseling for mental health support.
- **Academic Advising:** Contact your department advisor for academic planning questions.
- **Writing Center:** https://www.colorado.edu/writingcenter for support with technical writing.

If you are struggling in this course and are not sure what to do, email me. That is what I am here for.