Syllabus

Access Course Schedule

[redacted]

Meet Prof. Hodgkinson

Contact Information

Instructor: Bobby Hodgkinson

Email: hodgkinr@colorado.edu

Office Location: AERO 150D

Office Hours: by request for Professor: [redacted]

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 aerial unmanned 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.

Outside of engineering, I enjoy exploring new technology especially in terms of working with AI in education. I'm on the executive board of a regional non-profit Rocky Mountain AI Interest Group focused on exploring and promoting ethical use of AI in our community. While this course does not focus on AI, I believe it is my responsibility as your instructor to introduce you to key principles of generative AI that can support your development as a world-class engineer.

Communication

The primary means for general course announcements will be via course-wide Canvas announcement. Please ensure you have enabled notifications. Private student questions or coordination can be handled via email to the instructor. Include the course title in the email subject line. Emails to the instructor should occur if you experience a medical/family emergency, or if you are struggling in the course and need to discuss success strategies. Emails will be responded to during business hours, i.e. Monday through Friday, 8:00 am – 5:00 pm. You should expect a response within 48 hours, if you have not received a response within that time please feel free to send a follow-up email. Please note in case of a medical/family emergency, you should contact the office of Student Support and Case Management here: <https://www.colorado.edu/studentaffairs/sscm>. They will help you coordinate across ALL of your courses and can put you in touch with a number of campus resources.

Meet Prof. Glusman

Contact Information

Instructor: Jeff Glusman

Email: jeff.glusman@colorado.edu

Office Location: AERO N205

Office Hours: by request for Professor: [redacted]

Instructor Bio

Jeff Glusman - Assistant Teaching Professor, Smead Aerospace Engineering Sciences

Hi everyone! I'm Jeff Glusman, and I'll be your instructor for this course. My background is in computational fluid dynamics, thermodynamics, and signal processing. I'm excited to be at the start of your computational journey!

Outside of engineering, I enjoy woodworking - I absolutely love the challenge of designing new pieces, doing process engineering to streamline batching out large quantities of items, and admiring all the practical engineering that goes into many tools! This is a great video overview of the SawStop technology in 19k frames/second: https://www.youtube.com/watch?v=SYLAi4jwXcs

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About the Course

Course Description

The goal of this course is to develop a foundational understanding of computational thinking required to approach engineering challenges with systematic problem-solving skills. By the end of this class, students will be able to apply computational thinking principles to design, implement, and debug programs using a high-level programming language (MATLAB). Additionally, students will demonstrate proficiency in fundamental programming concepts, including variables, control structures, arrays, and functions, while also showcasing the ability to analyze problems, decompose them into smaller tasks, and devise algorithmic solutions.

Course Objectives

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

1. **Explain** and **apply** the core principles of computational thinking, including decomposition, pattern recognition, abstraction, and algorithm development.
2. **Implement** fundamental programming constructs such as variables, control structures, arrays, and functions.
3. **Develop**, **test**, and **debug** MATLAB programs required to solve basic Aerospace Engineering application problems.

Prerequisites

N/A

Required Texts

Textbook: No specific textbook is required. Students are expected to use materials provided through Canvas, including lab guides, tutorials, and supplemental readings.

Software: MATLAB is required for assignments and lab activities. MATLAB is available for free download through the University of Colorado Boulder’s license.

Hardware: A device capable of accessing Canvas, MATLAB and submitting assignments in PDF format.

Optional Resources: Supplemental MATLAB textbooks or online tutorials (e.g., “MATLAB for Engineers” by Holly Moore, ISBN: 978-0134589640).

Method of Instruction

This course will be conducted in a face-to-face format with supplementary online resources available through Canvas, the University’s Learning Management System (LMS). Students should expect: In-Person Sessions. These sessions will include lectures, hands-on experiments, activities, and instructor-led discussions to reinforce theoretical concepts.

Online Components via Canvas: Access lab documents, assignments, supplemental readings, etc. Submit assignments and track progress. Receive updates and announcements from the instructor. Instructor Support: Use the Calendly link provided for scheduling additional meetings.

Student Responsibilities and Class Expectations

Preparation: Review materials and complete assigned tasks prior to the scheduled sessions.

Engagement: Actively participate during in-person sessions.

Attendance is expected. Missing class may result in difficulty keeping up with the materials.

Asynchronous Expectations: Students should expect to dedicate a minimum of 100 minutes per week outside of class for reviewing materials and completing assignments. Deadlines will be clearly communicated through Canvas. Attendance is not required by participation is required. The vast majority of the work and effort in this class will take place in group settings or to contribute to group content.

Assignments and Grading

Submission Policies

Submission Platform: Assignments must be submitted via Canvas unless otherwise stated. Submissions must include the names of all contributing members.

File Format: It is important to follow file format requirements. 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. Extensions must be requested at least 24 hours before the due date.

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

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 allocation of points is not a valid reason for regrade and will not be considered.

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 information.

Points can be added OR removed based on correctness. Therefore, if a mistake was made in grading and too few points were awarded, the regrade request may increase the final score, however if the professor finds a mistake was made in grading and too many points were awarded, then the regrade request may lower the final score.

Regrades made in the final two weeks of the course will only be entertained if the regrade alters the individual's final letter grade.

Grading Structure Overview

This course uses a **tiered grading system** focused on completion, understanding, and engagement. Your final grade depends on your performance on quizzes, labs, projects, and participation. This grading approach is designed to mimic real-world performance reviews. To remain employed you must meet the minimum expectations set by your employer, and you will be rewarded for effort that goes above and beyond those minimum expectations.

Final Grade Tiers

Requirement	C-	B*	A
Pass all labs	✔	✔	✔
Minimum MATLAB trainings (3)	✔	✔	✔
75%+ in-class concept quizzes**	✔	✔	✔
75%+ participation completion	✔	✔	✔
4 B-level trainings *or* 2 + project		✔	✔
1 A-level MATLAB training			✔
Complex personal project			✔

**For a B, students must complete either all 4 B-level trainings or 2 B-level trainings plus a project.*

***Or the final exam.*

Concept Quizzes

Concept quizzes are a core part of how we'll assess your understanding. Each quiz focuses on one or two key ideas, small, digestible topics that build a much larger understanding over time.

These quizzes will include a multiple-choice question or questions, but more importantly, a **short answer explanation** where you tell us why one answer is right and another is wrong. Following most of the lectures you'll complete an at home concept quiz on Canvas. We will use an AI-augmented feedback program to help evaluate your explanation and generate personalized feedback. Then, a human will review and revise that AI-augmented feedback and provide you a **personalized report**. We use AI in an augmented fashion because we *care deeply* about your understanding, and we have moral objections to using unsupervised AI in education.

Midterm Concept Assessments (2)

In-class and cumulative.

Twice during the semester, you'll take **in-class concept assessments**, which are graded and are very similar to the weekly concept quizzes. This gives you clear incentive to engage with the at-home concept quizzes. The final exam may be used to improve the overall concept quiz score.

In class assessments will be closed-book, closed-notes, closed-internet. Students who access unauthorized materials during the in-class assessment will receive an immediate failure on the entire assessment and will be found in violation of CU Honor Code.

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

Accommodations: 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.

Code Interviews (3)

Programming classes were historically graded based on the programs students turned in. Today, numerous free generative AI chatbots can complete most programming assignments as well or better than graduate level students. Frontier AI models can write code that is better than mid to late career software developers in a small fraction of the time. We are aware that the societal landscape of programming have changed, so we've adapted the course.

You'll participate in code interviews, an established industry and education practice where a programmer explains their code to someone else.

There will be 2-3 code interviews this semester:

The first interview will be based on code that you create during the MATLAB Academy exercises.

The second code interview will be based on Labs 4- 6.

The final code interview will be a explanatory showcase of your final project code.

In each case, you'll explain your code to a teaching team member and respond to a follow-up question.

Labs (6 total)

- Labs 1–3: Exercises based on programming fundamentals
- Labs 4–6: Aerospace engineering specific exercises using programming fundamental.

Weekly Participation

Includes in-class activities and reflection exercises.

MATLAB Online Trainings

Instead of traditional problem sets to reinforce topics, you'll complete short courses from **MATLAB Academy**. These are interactive modules designed by MathWorks and aligned with our course topics. Completing them demonstrates that you can learn from diverse sources, not just lectures.

They're not just academic, they're **resume boosters.** You'll earn **badges** as you go, which you can share with potential employers to showcase your skills in a standardized, verifiable way. Think of them as micro-credentials which you have free access to through your tuition. In this class you'll complete a minimum of three Learning Paths earning badges and you'll be rewarded (as in higher letter grades) for completing more.

Grade Tiers

Your final letter grade is determined by the combination of tasks you complete:

To earn a C-:

- Pass all labs
- Complete the **minimum required MATLAB trainings**:

    - MATLAB Onramp
    - Core MATLAB Skills
    - Programming in MATLAB
- Score 75% or higher on in-class concept quizzes. Note: the final exam may be used to improve the in-class concept quiz score.
- Complete at least 75% of weekly participation exercises.

To earn a B:

- Complete all **C-** level requirements, and:
    - Either complete all additional B-level MATLAB trainings:
        - Build MATLAB Proficiency
        - MATLAB Skills for Simulink Modeling
        - Visualization in MATLAB
        - Data Analysis in MATLAB
    - OR complete any 2 of the above B-level trainings **and** a personal project or the class baseline project.

To earn an A:

- Complete all **B**-level MATLAB trainings, and:
    - Complete one additional MATLAB training from the list below:
        - MathWorks Certified Associate Exam Prep
        - Advanced MATLAB Programming Skills
        - Organize Tabular Data in MATLAB
    - Complete a personal project that is as complex or more complex than the baseline time tracker.

Intermediate letter grades (e.g., C, C+, B–, B+, A-) will be assigned based on partial completion of the next grade tier's requirements at the discretion of the instructor.

Individual grades may be adjusted based on instructional team evaluations to ensure fairness and accountability. Exemplary observations may result in an increased individual grades whereas poor observations will result in a lower assigned grade. Individuals whose name does not appear on a submission will not receive credit for the assignment.

Grading Philosophy: Your letter grades will be assigned based on expectations of performance. A letter grade of 'A' represents superior/excellent performance, a grade of 'B' represents good/better than average performance, while a grade of 'C' represents competent/average performance (which is in accordance with CU grading policy). We reserve the right to normalize the class grades based on the expected minimum level of competency.

We reserve the right to make changes to the weekly course schedule based on occurring events that require different dispositions. We will give sufficient advance notice through announcements in class and posting on the website. Changes to this syllabus and schedule may be announced at any time during class periods. We will post the current syllabus and schedule on the course website.

Use of MATLAB is required unless otherwise stated for labs.

Attendance at all scheduled meeting times is recommended. Participation in lab activities is required. Participation will be determined based on in lab observations by the instructional team. Each individual is responsible for their own contributions.

Lab documents will be provided in advance of the labs, which provide a detailed description of various steps and milestones in each lab. You are required to carefully study the lab documents before the beginning of each lab section. These lab documents will also include guidelines for the work that needs to be submitted for each lab.

Course and University Policies

Generative Artificial Intelligence (AI) Course Policy

The AI policy in this course is only for this course. It should not be viewed as department, college, or university policy. Students are encouraged to explore the use of generative AI tools (e.g., ChatGPT, NotebookLM, and other platforms) as part of their learning experience. AI is an emerging technology, and learning to use it effectively is a valuable skill. However, the use of AI must align with the following guidelines:

1. Purpose: AI tools should serve as an **assistant** to your learning, not a replacement for your own critical thinking or effort.
2. Transparency: If you use AI to assist with an assignment, you must include a brief disclosure statement at the end of the submission. This statement should:
    1. Specify which AI tool(s) you used.
    2. Describe how you used the tool (e.g., “used ChatGPT to refine the clarity of my writing”).
    3. Reflect on what you learned about the AI’s capabilities and limitations.
    4. Your AI disclosure should appear as a final paragraph or appendix to your submission, clearly labeled.
3. Examples of Acceptable Use:
    1. Generating ideas or brainstorming for assignments.
    2. Refining the clarity and conciseness of written work.
    3. Drafting code snippets or debugging assistance.
    4. Enhancing visual aids, such as charts or illustrations, where applicable.
4. Prohibited Use:
    1. Copying and pasting AI-generated content as your complete submission without modification or critical engagement.
    2. Using AI to fabricate data, solutions, or analysis for any assignment.
    3. Submitting AI-generated responses without proper attribution, as this may be considered plagiarism.
5. Limitations:
    1. AI-generated content is often prone to inaccuracies or biases. Always verify any outputs from AI tools against reliable sources.
    2. Low-effort prompts will result in subpar outcomes. Invest effort in crafting detailed and specific prompts to get useful responses.
    3. AI tools are supplements, not substitutes, for genuine engagement with the course material.

Students are responsible for the integrity and originality of their work. Any use of AI that violates the guidelines above may be treated as a breach of academic integrity under CU Boulder’s Honor Code. Failure to disclose AI use, or use of AI in ways that violate these guidelines, may result in academic penalties, including a report to the Honor Code Council, a failing grade on an assignment and/or the entire course. This policy applies specifically to this course. Other courses may have different expectations, and students are responsible for understanding and adhering to AI use policies in each class. Resources and optional tutorials may be provided via Canvas. Students are highly encouraged to reach out to the instructor with

questions or for help in learning to use AI responsibly. The instructional team may use various forms of AI to aid in content creation, to gain insight into the progress of individuals, to aid in the assessment process, generate AI-augmented feedback, etc. The instructional team will never use AI to produce a numerical score on a summative assignment but AI may be used to help in the creation of helpful feedback and expedite the grading process for the benefit of the students.

Lab Environment Policy

Safety is priority #1 in the in-person laboratory. Anyone violating rules of safe conduct may receive a zero for the laboratory exercise and may be restricted from the lab facilities. Use of lab facilities is a privilege, not a right, and you must conduct yourself according to the lab rules and regulations. Those endangering themselves, others, or laboratory equipment by their unsafe conduct will not maintain their access privileges. Failure to wear appropriate safety gear will result in a 10% grade penalty for the lab for each infraction.

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 professor either in person or via email.

Eating and drinking inside the laboratory is strictly prohibited.

Online Communication Guidelines

It’s important to create a respectful and supportive online learning environment for everyone. Here are some simple tips to keep in mind:

1. **Think Before You Post and Treat Others with Respect:** Messages online don’t include tone or body language, so they can be misunderstood. Take a moment to review your words before hitting “submit”. If you aren’t willing to say it to someone in person it should not be said online.
2. **Stay On Topic:** Discussions are an opportunity to connect with classmates and discuss the course material in a meaningful way. Stay focused on the course material and don’t use the discussion space for casual chats or unrelated topics.
3. **Avoid Using ALL CAPS:** Writing in all caps seems like you are virtually yelling. It can come across as rude. Use capital letters only when needed.
4. **Use Clear and Respectful Language:** Avoid abbreviations and written slang. Educational discussions are not text conversations. If you are going to use emojis make sure they are in context and appropriately placed.
5. **Value Everyone’s Time:** Classmates cannot respond to your post and the chance to foster discussion is lost if your post is late or done right as it is due. Please don’t wait until the last minute to post.

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 and/or sit in a location that avoids the recording area.

University Policies

A copy of the University Policies is available on the CU Resources page.