

# ASEN 1320: AEROSPACE COMPUTING AND ENGINEERING APPLICATIONS

FALL 2022

*Material is preliminary and subject to change*

## COURSE OVERVIEW

Instructional Team	Lecture/Recitation	Office Hours
Alexandra Le Moine ( <b>Instructor</b> ) <a href="mailto:Alexandra.LeMoine@colorado.edu">Alexandra.LeMoine@colorado.edu</a>	<b>Lec:</b> M/W/F 8:00-8:50am <b>Room:</b> ECCS 201	F 9:05-11:00am (Aero N209) <i>tentative</i>
Karina Rivera ( <b>TA</b> ) <a href="mailto:karina.riveralopez@colorado.edu">karina.riveralopez@colorado.edu</a>	<b>Rec:</b> (012) T 1:00-1:50pm <b>Room:</b> ECCE 141	TBD
Thomas Dunnington ( <b>TF</b> ) <a href="mailto:thomas.dunnington@colorado.edu">thomas.dunnington@colorado.edu</a>	<b>Rec:</b> (016) Th 10:40-11:30am <b>Room:</b> ECCR 143	TBD
Janelle Nedrow ( <b>TF</b> ) <a href="mailto:sarah.nedrow@colorado.edu">sarah.nedrow@colorado.edu</a>	<b>Rec:</b> (015) Th 9:35-10:25am <b>Room:</b> ECCR 143	TBD
Chris Lolkema ( <b>TF</b> ) <a href="mailto:christopher.lolkema@colorado.edu">christopher.lolkema@colorado.edu</a>	<b>Rec:</b> (011) T 2:05-2:55pm <b>Room:</b> ECCE 141	TBD
Ariana Bower ( <b>TF</b> ) <a href="mailto:ariana.bower@colorado.edu">ariana.bower@colorado.edu</a>	<b>Rec:</b> (013) W 9:05-9:55am <b>Room:</b> ECCR 143	TBD
Ben Watanapongse ( <b>TF</b> ) <a href="mailto:benjamin.watanapongse@colorado.edu">benjamin.watanapongse@colorado.edu</a> Tyler Candler ( <b>TF</b> ) <a href="mailto:tyler.candler@colorado.edu">tyler.candler@colorado.edu</a>	<b>Rec:</b> (014) W 4:15-5:05pm <b>Room:</b> Aero N100	TBD
Julia DiTomas ( <b>TF</b> ) <a href="mailto:julia.ditomas@colorado.edu">julia.ditomas@colorado.edu</a>	-	TBD
Austin Hunter ( <b>TF</b> ) <a href="mailto:austin.hunter-1@colorado.edu">austin.hunter-1@colorado.edu</a>	-	TBD
Grace Halbleib ( <b>TF</b> ) <a href="mailto:grace.halbleib@colorado.edu">grace.halbleib@colorado.edu</a>	-	TBD
Alex Kistamma ( <b>TF</b> ) <a href="mailto:alex.kistamma@colorado.edu">alex.kistamma@colorado.edu</a>	-	TBD

**Web Site:** Canvas (<https://canvas.colorado.edu/courses/85571>)<sup>a</sup>  
**Q&A:** Piazza([piazza.com/colorado/fall2022/asen1320/home](https://piazza.com/colorado/fall2022/asen1320/home))<sup>b</sup>  
**IDE:** MATLAB<sup>c</sup> AWS Cloud9<sup>d</sup>  
**Quizzes:** Quizzes are administered through course website  
**Homework:** All assignments<sup>e</sup> can be turned in via course website

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<sup>a</sup>Quizzes are administered through Canvas. All assignments can be submitted through Canvas

<sup>b</sup>Piazza is used for class-wide Q&A and discussion, and can be accessed via Canvas

<sup>c</sup>MATLAB license is available for CU students at no cost from <https://oit.colorado.edu/>

<sup>d</sup>AWS Cloud9 Integrated Development Environment used for C++ can be accessed via course website

<sup>e</sup>Homework is assigned via Gradescope and MATLAB Grader that can be accessed via course website

## **COURSE OBJECTIVES**

Most aerospace engineering programs require literacy in some programming language (e.g., C++, MATLAB) for automating various types of numerical and symbolic computation. This course is intended for students with little to no experience in programming and teaches basic programming concepts and useful tools for solving engineering problems with an emphasis on aerospace applications.

## **COURSE LEARNING GOALS**

The goal of this course is to build the basic foundation in computing and programming required to succeed in the sophomore and junior curriculum in aerospace engineering and other related domains of engineering. By the end of this course, students should be able to:

- Identify the overall structure of computing program.
- Explain the differences between a compiled (C++) and an interpreted language (MATLAB).
- Use different primitive data types such as integers, floating point, and strings.
- Implement fundamental programming constructs such as variables, assignment statements, expressions, conditionals, and iterative constructs.
- Create and manipulate 1D and 2D arrays, implement arrays within looping constructs, and pass arrays into functions.
- Understand the scope of functions and know how to use functional programming.
- Read/write data and use file I/O.
- Understand the concepts of class, object, and object-oriented programming.
- Know to how use C++ classes and MATLAB function/graphics handles.
- Develop skills to use basic data visualization functions in MATLAB.
- Develop skills to write, test, and debug code required to solve basic aerospace engineering application problems.

**COURSE SCHEDULE**

<b>Week(s)</b>	<b>Topic</b>	<b>Text Chapter</b>
1	Introduction to C++ and MATLAB, Program Structure	
2	C++: Variables, Operators (e.g., arithmetic, logical)	Ch 1.2 C++
3-4	C++: Flow of Control (e.g., if-else, loops)	Ch 2.1-2.3 C++
5	C++: Introduction to Arrays (e.g., 1D, 2D)	Ch 5.1,5.4 C++
6	C++: Functions (e.g., predefined, user-defined)	Ch 3.1-3.2 C++
7	C++: Function Scope Rules, Arrays in Function	Ch 3.3,5.2 C++
8	MATLAB: Intro, Vector Manipulation	Ch 1-3 MATLAB
9	MATLAB: Loops and Conditional Statements	Ch 4-5 MATLAB
10	MATLAB: Functions and Scope, M-files	Ch 6 MATLAB
11	MATLAB: Visualization and Plotting	Ch 9,12 MATLAB
12	MATLAB/C++: Read and Write, File I/O	Ch 9 MATLAB Ch 12 C++
13	MATLAB/C++: Structure	Ch 8 MATLAB Ch 6.1 C++
14	MATLAB/C++: Class, Object (e.g., MATLAB handles, Intro C++ OO Programing)	Ch 11 MATLAB Ch 6.2 C++
15	Wrap-up	

**TEXTBOOKS**

- C++ Textbook - Walter Savitch (2016): Absolute C++, *6th Edition*, Pearson.  
Print version on reserve at CU Library and scanned chapters will be made available for students <https://www.colorado.edu/libraries/>
- MATLAB Textbook - Stormy Attaway (2019), MATLAB, A Practical Introduction to Programming and Problem Solving, *5th Edition*, Elsevier.  
Free e-book version available for students from CU library: <https://www.colorado.edu/libraries/>

**SUPPLEMENTAL RESOURCES**

- MATLAB MathWorks Documentation <https://www.mathworks.com/help/matlab>
- MATLAB Online Course <https://matlabacademy.mathworks.com>

**STUDENT EXPECTATIONS**

- Students are expected to study for weekly quizzes, interview grading sessions, and turn in all the class work, including recitation assignments, homework assignments, and a final project. **A passing grade will not be guaranteed by just showing up for lectures and recitations.**
- **B<sup>-</sup> grades and above are required to use ASEN 1320 as a prerequisite for CSCI 2270** (Data Structures) which is a pathway to a CS minor.
- Students may discuss and collaborate on the programming assignments, but students are NOT free to copy another student's assignment. **Students who are caught copying (or providing his or her assignment to another) will receive an "F" for the course and reported to the Honor Code office for further punitive action.**

**INSTRUCTOR EXPECTATIONS**

- Students may expect the instructor, TA, and TAs to be courteous, punctual, well-organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to provide notification beforehand if they are unable to keep them; and to grade uniformly and consistently according to the posted guidelines.

**COURSE GRADING** - Course grades will be determined on the basis of:

- Recitation assignments and participation (10%)
- Homework assignments (25%)
- Interview-grading of one C++ homework assignment (5%)
- Interview-grading of one MATLAB homework assignment (5%)
- Quizzes (15%)
- Practicum exam on C++ (10%)
- Practicum exam on MATLAB (10%)
- Final project (20%)

## INSTRUCTOR COMMUNICATION

- There are many students in this class. For the sake of fairness and efficiency **please attempt to get questions answered by the TA or TFs first.**
- Students are encouraged to ask questions on homework assignments and final project during recitations, office hours, and via Piazza.

## HOMEWORK ASSIGNMENTS

- There will be approximately 10 homework assignments in total
- **No late homework submissions will be accepted.**
- All homework assignments are to be turned in electronically via Canvas. **Students should make an effort to turn in assignments that are written neatly and organized with a professional appearance.** Proper documentation and commenting should be used to explain programming concepts employed. Students' name and section number and the date must be at the top right of the first page of the assignment write-up and code files.
- Students are encouraged to collaborate with other students on homework assignments but must submit their own original work. **Students are not allowed to directly copy each others work. Student submissions are automatically checked for similarity. Students who submit copied code will receive an automatic failure and will be found in violation of CU Honor Code.**

## INTERVIEW GRADING

- **Two homework assignments will be graded through a 10-minute interview with one of TA and TFs on the assignment and project report submitted in the previous week.** The purpose of interview grading is to test students' understanding of the code and provide students with an opportunity to ask questions.
- Students are responsible for scheduling interview grading with the appropriate recitation TA or TF by Friday before the interview grading week. In case of unexpected circumstances, students must contact and work out an alternative plan with your TA or TF for rescheduling interview grading **via e-mail at least 24 hours notice.**
- Students are advised to arrive for the scheduled appointment 5 minutes early and use the extra time to prepare for the interview. There is a 1-minute grace-period for being late, after that it is 10% off for each minute the student is late. Not showing up without advance notification results in zero credit. (See the Interview Grading Scheduling Policy below for an exception)

**QUIZZES**

- Quizzes will be administered weekly via Canvas.
- The lowest quiz grade will be dropped.
- **No late quiz submissions will be accepted.**

**PRACTICUM EXAMS**

- There will be **two 45-minute practicum exams which assess the students abilities to program in C++ and MATLAB, respectively.**
- Practicum exams are closed-noted, closed-internet, and held during recitation.
- Students are NOT allowed to share the exam problem or exam code with other students. Each recitation section will receive a different problem.

**FINAL PROJECT**

- There will be a comprehensive final project in place of a final examination.
- **No late final project submissions will be accepted.**

**LATE POLICY**

- **No late submissions will be accepted.** No late submissions for recitation assignments, quizzes, homework assignments, and final project. (See the Due Date Extension Policy below for an exception)

**DUE DATE EXTENSION POLICY**

- Students are responsible for contacting and working out an alternative plan with your recitation TA or TF for submitting homework assignments, recitations, project, and any other assignments if these cannot be completed in time due to unexpected situations. These requests will be evaluated on a case-by-case basis, and assignment extensions require **at least 48 hours email notification to your recitation TA or TF prior to the assignment deadline.**

**ATTENDANCE POLICY**

- Attendance at all lectures is expected, but is not counted towards the final grade. **Attendance at all recitations is required and closely monitored, and is counted towards grades.**

- Students are responsible for knowing the material presented at lectures and recitations, even in the case of students' absence when the material was presented.

### **REGRADE POLICY**

- Manual regrading requests will be evaluated on a case-by-case basis, if students' final code is submitted to the Gradescope or MATLAB Grader autograder before the submission deadline. Students will be asked to provide a detailed description of how the code works as well as a discussion of why the code has failed to pass the autograders' test.



## General Policies

### Classroom Behavior:

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail 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, 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](#).

### Requirements for COVID-19:

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. CU Boulder currently requires COVID-19 vaccination and boosters for all faculty, staff and students. Students, faculty and staff must upload proof of vaccination and boosters or file for an exemption based on medical, ethical or moral grounds through the MyCUHealth portal.

The CU Boulder campus is currently mask-optional. However, if public health conditions change and masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the “Accommodation for Disabilities” statement on this syllabus.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the Public Health Office ([contacttracing@colorado.edu](mailto:contacttracing@colorado.edu)). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the Public Health Office ([contacttracing@colorado.edu](mailto:contacttracing@colorado.edu)).

### Accommodations for Disabilities:

If you qualify for accommodations because of a disability, please submit your accommo-

dation 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](mailto:dsinfo@colorado.edu) for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

**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.

**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, 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. All incidents of academic misconduct will be reported to Student Conduct Conflict Resolution ([honor@colorado.edu](mailto:honor@colorado.edu); 303-492-5550). 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. Additional information regarding the Honor Code academic integrity policy can be found on the [Honor Code website](#).

**Sexual Misconduct, Discrimination, Harassment And/Or Related Retaliation:**

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. The university will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or email [cureport@colorado.edu](mailto:cureport@colorado.edu). Information about university policies, [reporting options](#), and the support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options. To learn more about reporting and support options for a variety of concerns, visit [Don't](#)

[Ignore It.](#)

**Religious Holidays:**

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please see the regular due date extension policy above. See the [campus policy regarding religious observances](#) for full details.