Aerospace Computing and Engineering Applications
Spring 2021

Instructor:	Nicholas Rainville	Email: Nicholas.Rainville@colorado.edu
Office Hours: W 4:00-5:00pm		Zoom: https://cuboulder.zoom.us/j/99058439079
Lecture Section:	M/W/F 9:10-10:00am	
TA:	Lyndsay Ruane	Email: Lyndsay.Ruane@colorado.edu
Office Hours: TBD		Zoom: https://cuboulder.zoom.us/j/91051290602
Recitation Section:	**101** T 11:30a, **102** T 12:40p	
TF:	Anand Kappagantu	Email: Anand.Kappagantu@colorado.edu
Office Hours: M 1:00p-3:00p		Zoom: https://cuboulder.zoom.us/j/789766456
Recitation Section:	**105** Th 12:40p	
TF:	Margaux McFarland	Email: Margaux.Mcfarland@colorado.edu
Office Hours: M 11:00a-1:00p		Zoom: https://cuboulder.zoom.us/j/93592356248
Recitation Section:	**104** Th 11:30a	
TF:	Brendan Palmer	Email: Brendan.Palmer@colorado.edu
Office Hours: W 11:10a-2:00p		Zoom: https://cuboulder.zoom.us/j/2151807308
Recitation Section:	**103** W 10:20a	
TF:	Ian Faber	Email: Ian.Faber@colorado.edu
Office Hours: T/Th 1:00p-2:30p		Zoom: https://cuboulder.zoom.us/j/5970515189

Course Web Site: https://canvas.colorado.edu/

Q&A: Piazza is used for class wide discussions and questions. See the course web page on Canvas for the Piazza link.

Lectures: All lectures will be delivered through Zoom. See the course webpage on Canvas for the meeting link.

Recordings: Lectures and recitations will be recorded and the videos will be made available on Canvas.

Attendance: Attendance is required for all recitations and will count towards your grade.

Quizzes: Quizzes will be administered through Canvas

Homework: All assignments will be submitted through Canvas

Course Details

Course Objectives: Most aerospace engineering programs require literacy in some programming language (e.g. MATLAB, C++) for automating various types of numerical and symbolic computation. The course is for students with little or no prior 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 foundation in computing and programing required to succeed in the sophomore and junior curriculum in aerospace engineering and other related domains of engineering. Students will develop an understanding of the following concepts and skills in order to code in C++ and MATLAB to solve basic computing problems:

- Understand the overall structure of computing program.
- Understand the differences between a compiled (C++) and an interpreted language (MATLAB).
- Know how to use different primitive data types such as integers, floating point, and strings.
- Know how to implement fundamental programming constructs such as variables, assignment statements, expressions, conditionals, and iterative constructs.
- Know how to create and manipulate 1D and 2D arrays, use arrays within looping constructs, and pass arrays to functions.
- Understand the scope of functions and know how to use functional programming.
- Know how to read and 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 requited to solve basic aerospace engineering application problems.

Course Schedule:

Week	Topic
1	Introduction to C++ and MATLAB, Program Structure
2	C++: Variables, Operators (e.g., arithmetic, logical)
3	C++: Flow of Control (e.g., if-else, loops)
4	C++: Flow of Control (e.g., if-else, loops) Continued
5	C++: Introduction to Arrays (e.g., 1D, 2D)
6	C++: Functions (e.g., predefined, user-defined)
7	C++: Function Scope Rules, Arrays in Function
8	MATLAB: Intro, Vector Manipulation
9	MATLAB: Loops and Conditional Statements

10	MATLAB: Functions and Scope, M-files Final Project Introduction
11	MATLAB: Visualization and Plotting
12	MATLAB/C++: Read and Write, File I/O
13	MATLAB/C++: Structure
14	MATLAB/C++: Class, Object (e.g., MATLAB handles, Intro C++ OO Programing)
15	Wrap-up

Textbooks:

- Walter Savitch (2016): Absolute C++,6th Edition, Pearson.
- Stormy Attaway (2018), MATLAB, A Practical Introduction to Programming and Problem Solving,5th Edition, Elsevier – eBook available from CU library

Supplemental Resources:

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

Course Grading: Course grades will be determined on the basis of:

- Quizzes (15%)
- Recitation Participation (10%)
- Homework Assignments (35%)
- Final project (20%).
- Interview Grading (20%)
     o C++ (5%)
     o MATLAB (5%)
     o Final project (10%)

A grade of a B− or above is required to use ASEN 1320 as a prerequisite for CSCI 2270 (Data Structures) which is a pathway to a CS minor.

Assignment and Quiz Policy:

- **No Late Submissions** will be accepted for recitation assignments, quizzes, homework assignments, or the final project.
- **Your lowest assignment grade will be dropped**
- **Your lowest quiz grade will be dropped**
- Two homework assignments and the final project will be graded through a 10-minute interview with one of TAs/TFs on the assignment and project report submitted the previous week. The purpose of interview grading is to test students' understanding of the code and to provide students with an opportunity to ask questions. Students are responsible for scheduling the interview grading sessions as instructed. It is advisable to be on Zoom 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 late. At 6 minutes late you get zero credit. Not showing up without emailing in advance results in zero credit.

- All homework assignments will be turned in electronically via Canvas. Students should 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. If students' assignment is not legible for grading, students will receive one and only one warning. Further failure to turn in a legible and clearly organized assignment after the first warning will result in zero credit for that assignment.

Group Assignments:

- 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.

Communication Policy:

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

Interview Grading Scheduling:

- Students are responsible for scheduling interview grading with your 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 48 hours notice.

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 policies on classroom behavior and the Student Code of Conduct.

Requirements for COVID-19

As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements, and public health orders in place to reduce the risk of spreading infectious disease. Required safety measures at CU Boulder relevant to the classroom setting include:

- maintain 6-foot distancing when possible,

- wear a face covering in public indoor spaces and outdoors while on campus consistent with state and county health orders,

- clean local work area,

- practice hand hygiene,

- follow public health orders, and

- if sick and you live off campus, do not come onto campus (unless instructed by a CU Healthcare professional), or if you live on-campus, please alert CU Boulder Medical Services.

Students who fail to adhere to these 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 policies on COVID-19 Health and Safety and classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please see the "Accommodation for Disabilities" statement on this syllabus. All students who are new to campus must complete the COVID-19 Student Health and Expectations Course. Before coming to campus each day, all students are required to complete the Buff Pass.

Students who have tested positive for COVID-19, have symptoms of COVID-19, or have had close contact with someone who has tested positive for or had symptoms of COVID-19 must stay home. In this class, if you are sick or quarantined, In this class, if you are sick or quarantined, notify the course coordinator (nicholas.rainville@colorado.edu) that you will be absent. You do **not** need to state the nature of your illness or provide a doctor's note, but you are required to provide notification within 5 days of the lecture or project section absence.

Accommodation for Disabilities

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.

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 policy may include: 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 the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to fostering an inclusive and welcoming learning, working, and living environment. CU Boulder 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 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 cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when 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 options for reporting and support resources.

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, you must let the instructors know of any such conflicts within the first two weeks of the semester so that we can work with you to make reasonable arrangements.

See the campus policy regarding religious observances for full details.