
[CS 1112] INTRODUCTION TO COMPUTING USING MATLAB

FALL 2022

COREQUISITES: MATH 1110, MATH 1910, or equivalent

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OFFICE HOURS: M 2:30 - 4 pm or by appointment

COURSE WEBSITE: <http://www.cs.cornell.edu/courses/cs1112/2022fa/>

KEY DATES

- Tuesday, August 23rd: First lecture
- Wednesday, August 24th: First discussion section
- Tuesday, October 18th: Prelim 1 (7:30 - 9 PM)
- Thursday, November 10th: Prelim 2 (7:30 - 9 PM)
- Thursday, December 1st: Last lecture
- TBA: Final exam

COURSE DESCRIPTION

Programming and problem solving Using MATLAB. Emphasizes the systematic development of algorithms and programs. Topics include iteration, functions, vectors and arrays, strings, recursion, algorithms, object-oriented programming, and MATLAB graphics. Assignments are designed to build an appreciation for complexity, dimension, fuzzy data, inexact arithmetic, randomness, simulation, and the role of approximation. No programming experience is necessary; some knowledge of calculus is required.

KEY LEARNING OUTCOMES

- Be fluent in the use of procedural statements—assignments, conditional statements, loops, function calls—and arrays.
- Be able to design, code, and test small MATLAB programs that meet requirements expressed in English. This includes a basic understanding of top-down design.
- Have knowledge of the concepts of object-oriented programming as used in MATLAB: classes, subclasses, properties, inheritance, and overriding.
- Have knowledge of basic vector computation.
- Have a working familiarity with graphics tools in MATLAB.
- Have knowledge of basic sorting and searching algorithms.

GRADING SCHEME

This course is not a competition for grades. We do not “curve” scores in order to achieve some predetermined grade distribution, as that would emphasize ranking. Instead, we assign final grades based on individual performance with the following interpretations:

- **A:** Student has mastered the material (can become a consultant).
- **B:** Student is strong enough to continue in further computing courses, including CS 2110, and in the CS major.
- **C:** Student has an adequate foundation in scientific and engineering computation.

Grades of D and F are rare and typically result from missing work. With the "S/U" grade option, you need a 'C-' or better in order to receive an S.

We do not commit to hard grade boundaries, as rubrics need to be calibrated to the unique circumstances of each semester. As a point of reference, historically students in the 'A' range had scores over 93, those in the 'B' range scored above 80, and those scoring over 65 earned at least a 'C-'.


Items that count towards your course grade include:


- Projects are medium-size programming assignments through which you synthesize the knowledge gained in recent weeks. For most projects you may work individually or with one partner (you may have a different partner on different assignments).
 - You may drop your lowest project score provided that you scored at least 50% on that project. This helps accommodate an unusual, difficult situation without having to justify the circumstances to the instructor, so long as the submission still reflects a reasonable amount of effort. Submissions will be accepted one day late with a 10% penalty.
- Discussion exercises are short programming tasks that give you practice on the topics of the week. They are assigned weekly and you get help and additional instructions on them during your discussion section. Exercises are “graded” mostly on effort. You are encouraged to collaborate with discussion section classmates but you will submit your work as an individual.
- Exams assess how well you have internalized the material so far in the course. Preliminary exams provide feedback on whether your study habits are sufficient to meet your learning goals, allowing you to adjust as necessary for the remainder of the semester. There will be two prelim exams and one final exam.
- We will use Poll Everywhere for in-class questions. To enroll in Poll Everywhere, follow the instructions in [this document](#). There will be questions every class and your 4 lowest days of score will be dropped (i.e. you can miss 4 days and still get 100% credit).

Your course score is computed using the following weights:

Course component	Percentage of grade
Discussion exercises	5%
Projects	40%
Prelim 1	15%
Prelim 2	15%
Final	24%
Poll Everywhere questions	1%

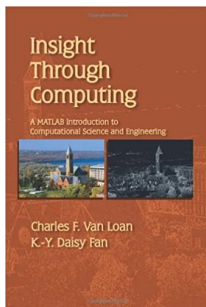
TEXTBOOKS, SOFTWARE, AND COURSE MATERIALS

 **ONLINE RESOURCES:** All lecture notes, discussion worksheets, projects, and code provided in class will be available on the [course website](#). Assignment submission and feedback will be managed by CMS (<https://cmsx.cs.cornell.edu/>). If you have questions about the course material, post them to the [Ed Discussion](#) (online forum) so that others can benefit from the discussion.

 **SOFTWARE:** MATLAB Student Version, available *for free* to current students (with Cornell NetID). You can use the online version of MATLAB or download MATLAB on your computer:

1. Use MATLAB Online (<https://matlab.mathworks.com/>) via your web browser—no download required.
2. Download MATLAB student version onto your person computer. Get MATLAB through CU Software Licensing Store through Cornell Licensing. Navigate to the following link <https://it.cornell.edu/software-licensing/install-matlab#section-2> and follow all steps carefully. Come to office hours if you have trouble with this.
3. All students can use MATLAB Online at public computer labs across campus. Some public labs (especially the ones in the Engineering buildings) already have MATLAB installed.

 **TEXTBOOK:** The following textbook (which is available for free online) is required in either print or electronic form.



Title: Insight Through Computing: A MATLAB Introduction to Computational Science and Engineering

Authors: C. F. Van Loan and K.-Y. D. Fan

Publisher: SIAM Publication, publication year: 2009

ISBN: 978-0-898716-91-7

Available at: The e-book is available for free via the [Cornell Library Portal](#) (off campus? use this [proxy link](#)). On that page scroll down to see the PDFs of the individual chapters. You can also borrow the physical book from Olin library, in the Course Reserves area near the circulation desk, for 2 hour increments.

OFFICE HOURS AND CONSULTANT HOURS

The instructor, TAs, and consultants will all hold office hours throughout the semester. The consultant hours will be Sunday - Thursday from 4:30pm - 9:30pm. Check on the course website (linked at the top of the syllabus) to find a schedule of all office hours.

ACADEMIC INTEGRITY

Simply put, academic integrity is about respecting yourself and respecting others. You respect yourself by submitting work completed through your own effort; you respect others by acknowledging contributions from others when such external contribution is allowed. Refer to the University [Code of Academic Integrity](#) for further information.

SPECIAL ACCOMODATION You must write all exams at their scheduled times unless your request for special accommodation (medical reason, disability-related,

athletic obligation, or exam conflict) has been approved beforehand. Any request for exam-taking accommodation (aside from sudden illness) must be made at least one week before the exam, with documentation from Student Disability Services if appropriate. If illness or mental health prevents you from completing required work, email the course instructor as soon as possible to make an alternative arrangement for the missed work.

Please be mindful of public health—if you do not feel well and normally attend lectures or labs in person, you are encouraged to participate online that week instead. But do still attempt to complete projects on time (remember: you can drop a low project score so long as you made a good attempt given your condition).

Students with disabilities: Your access in this course is important. Please give course staff your Student Disability Services (SDS) accommodation letter early in the semester so that we have adequate time to arrange your approved academic accommodations.

- If you have, or think you may have, a disability, please contact Student Disability Services for a confidential discussion (sds_cu@cornell.edu, 607-254-4545).
- Once SDS approves your accommodation letter, it will be emailed to both you and the instructor. Please follow up with the instructor to discuss the necessary logistics of your accommodations.
- If you are approved for exam accommodations please consult with the course instructor at least one week before the scheduled exam date to make the alternative testing arrangements.
- If you need an immediate accommodation, please contact both the course instructor and SDS by e-mail.

Mental health:

COVID-19: Masks are encouraged but not required in classrooms for Fall 22, according to [university policy](#). However, the University strongly endorses compliance with requests to mask from students, staff, or faculty who are health compromised. If you are health compromised and would like me to request that the class be masked, please send me an email with any rationale that you are comfortable with me sharing. I do not need to identify you unless you would prefer that I do.

Zoom recordings of lectures are not available for absences, including absences due to illness. For any illness, you are expected to keep up with course material by working with a peer in the course or accessing the posted notes on the website. We will allow time to find a peer buddy in the first week of the course.

TENTATIVE COURSE CONTENT

Week	Topics
1	Introduction to the course and programming basics (variable assignments, variable types, input+output, printing, comments, and problem solving).
2	Conditionals, nested conditionals, and logical operators.
3	Iteration: for loops and while loops.
4	Developing algorithms, nested loops, and user-defined functions.
5	Executing a user-defined function, vectors, simulation.
6	Probability and averages, more vectors, and linear interpolation.
7	Vectorized computation, 2D arrays (matrices).
8	Working with images (vectorized code on multi-dimensional array).
9	More working with images (arithmetic in type uint8), character arrays, linear search.
10	Cell arrays, File I/O, Structs.
11	More structs and structure arrays, objects and classes.
12	class definition (properties and methods), array of objects, overloading, constructo that handles variable number of arguments.
13	Why Object Oriented Programming, Private vs. public, inheritance, and extending a class.
14	Recursion.
15	Sort+search and Divide+conquer.

NOTE: The above actual dates may be modified due to the requirements of the class. Also, the indicated dates may be moved backward or forward depending on class progress. **Exact dates and instructions will be announced on course webpage.**

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