

CS 2316 Data Input and Manipulation

Fall 2026

Instructor

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Dr. Musaev's OH: TBD

Course Description

This course will provide background and experience in reading, manipulating, and exporting data for engineering, business and scientific applications. Specific topics include file I/O, Graphical User Interfaces, web scraping, API accessing, data manipulation using Pandas and Numpy, and interfacing with SQL databases. Assignments will be modeled after business, engineering, and scientific problems. A semester-long project which incorporates many of the topics learned, will allow students to apply course concepts to a final project involving extremely large data files.

Course Objectives

By the end of this course, students will be able to import, read, and export data from a variety of file formats, including CSV, JSON, Excel, and text files, and effectively clean, transform, and manipulate datasets using tools such as Pandas and NumPy. Students will develop programs that automate data processing tasks for engineering, business, and scientific applications, and will design basic graphical user interfaces (GUIs) for data interaction and visualization. They will retrieve and process data from external sources through web scraping and API access, and will store, query, and manage data using SQL databases integrated into their programs. Students will apply appropriate techniques to efficiently work with large-scale datasets and will implement and interpret basic machine learning models using SciPy and related tools, including evaluating model performance through concepts such as fitting, prediction, and error analysis. Throughout the course, students will analyze real-world problems and develop data-driven solutions, communicate their results clearly through code and documentation, and complete a comprehensive project that integrates data acquisition, processing, analysis, and basic modeling.

Grading

- Participation 4%
- Homework 11%
- 3 Exams 60%

- Exam 1 20%
- Exam 2 20%
- Exam 3 20%
- Mini Projects 25% (3 mini-projects)

Grade Cutoffs: A: 90.0, B: 80.0, C: 70.0, D: 60.0 (grades will not be rounded)

Graded Material and Additional Criteria

Participation: Your participation grade will be determined by your grade on Mini Quizzes given during every lecture as well as your completion of required surveys.

Coding projects: There will be approximately 11 homework assignments totaling 11% and a final project worth 25% of your total grade.

Written exams: The first 2 exams will be given during the official lecture time and must be hand-written on paper. The last exam will be held during the final exam period but will not be comprehensive.

- Only 75 minutes will be given for the 3rd exam. Allowed per [GT Final Exam Policy #10](#). [Links to an external site.](#)

Makeup Exams:

- Approved makeup exams will be administered **immediately after Exam 3** during the final exam block.
- If you miss **more than one exam**, you should consider withdrawing from the course.

Assignments must be turned in before the date and time indicated as the assignment's due date. Late homework and projects will not be accepted.

Academic Integrity and Collaboration

We expect academic honor and integrity from students. Please study and follow the academic honor code of Georgia Tech: [Links to an external site.https://policylibrary.gatech.edu/student-life/academic-honor-code](https://policylibrary.gatech.edu/student-life/academic-honor-code) [Links to an external site.](#). You may collaborate on in class participation activities, but you must do your programming assignments alone or with TA help. **Each individual programming assignment must be coded by you.** Your submission must not be substantially similar to another student's submission. Collaboration at a reasonable level will not result in substantially similar code. **Students that turn in submissions that are not fundamentally unique will receive a zero and will be referred to the Dean of Students Office of Student Integrity.** You may not collaborate on exams. The use of ChatGPT or any AI-generated content is strictly prohibited. Submissions found to have been generated or significantly influenced by an AI Model Software will result in disciplinary action. The TAs

reserve the right to review and analyze your work for indications of AI usage. If we suspect that your submission was not independently created, we will report the incident for further investigation.

Regrade Policy for Homework and Exams

For homework and Exams 1 and 2, to contest a grade you must contact the instructor **within one week of the assignment's original return date**. For exam 3, you will have 24 hours to contest a grade after the assignment's return date. The original return date is the date the exam was first made available for students to pick up or the grade was posted online. After that point regrade requests will not be accepted. **There are no regrades for ANY final project phases.**

Prerequisites

A minimum grade of C in one of the following courses or transfer credit: CS1301, CS1301-Online, CS1371, CS1315

Required Course Material

- Programming Language and IDE
 - The language used in this class is Python. The software is free and can be downloaded from <https://www.python.org/downloads/> [Links to an external site.](#).
- Canvas and Gradescope
 - All course information and resources can be found in Canvas. This includes: Syllabus, Assignments, Quizzes, Announcements, Grades & Feedback, Practice Exams, etc.
- Lecture Code
 - The code from each lecture will be posted on Canvas under the Files tab by the end of the following day. Most assignments must be uploaded to Gradescope. Both Canvas and Gradescope are not forgiving about due dates and times. The assignment folder will close and you are not allowed to turn in your work any other way.

Course Reading Assignments

- Handouts for each unit of the course are available as links on the Living Schedule and are **required** reading.
- [Think like a computer scientist](#) Optional free online textbook

Attendance

Lecture attendance is **required**. Practice problems and miniquizzes will be done as part of the lecture and TAs will be available to assist you to complete these practice problems. Your

participation grade will come from your completion of these in-class practice problems as well as a few surveys throughout the semester. If you miss a mini quiz due to an institute approved absence, you may retake the miniquiz before the next exam in office hours.

Life Happens Policy

We recognize that unforeseen circumstances can arise. To address these, we have established a policy for handling issues such as unexcused absences, including those with notes from the Dean of Students stating, "It is up to the discretion of the instructor" or similar language. Our approach is as follows:

- The **lowest homework grade** will be dropped.

Please understand that these are your only options for dealing with sickness and other hardships. Use them wisely.

Expectations

What you can (and can't) expect from me

I will do my best to make sure that the content of this course will be what you need to know for your future coursework, internships and future full-time employment. I will try to create homework assignments that are challenging so you will have a feel for the type of problems you will encounter in your career. I will provide lecture materials, handouts, practice exams that can help you with the challenging work you will be completing this semester. I believe in being fair to all students so I do not allow special extensions for anyone just because they ask me. I have taught this course many times and am continuously striving to make it better.

What you can (and can't) expect from the TAs

The TAs in this course are an excellent resource during class time, office hours, and recitation. They develop new homework assignments each semester, write the autograders for these homeworks, and provide office hours to help you with them. All TA communications should be conducted during lecture, recitation, or office hours, as well as through Ed Discussion in private and public posts. Students should not be directly emailing their TAs any homework or material specific questions. Throughout final project work, students will be assigned a TA or TAs as a direct contact resource to answer all questions pertaining to their project. At this point, students can email their final project TA. However, any meetings or assistance should be conducted within scheduled office hours. TAs are not required to answer emails over the weekend or breaks.

What we expect from you

As an adult learner you are responsible for your choices. Although recitation attendance is not required, the TAs work hard to make these sessions valuable for you, so it is expected that you are attending these and asking questions to make sure you are keeping up with all the course material. The homework assignments must be completed by yourself alone. If you get stuck, the TAs can help you get unstuck, but the homework is your homework, not theirs. The grades you receive are the result of your performance, not your effort. You are responsible for communicating with myself and the TA team well in advance of any special approved absences or circumstances.

Accessibility

Students with disabilities: your access to this course is extremely important to us. The institute has policies regarding disability accommodation, which are administered through the [Office of Disability Services Links to an external site.](#)

Please request your accommodation letter as early in the semester as possible so we can arrange your approved academic accommodation as we cannot retroactively apply accommodations.

Professionalism and Student Conduct

We strive for a professional atmosphere and do so by following [GT Student-Faculty Expectations.](#)

Professional behavior is expected at all times—both in-person and online. This includes respectful communication with peers, teaching assistants, and instructors, whether via email, forums, meetings, or class discussions.

Clear, courteous, and constructive dialogue fosters a positive learning environment for everyone. Inappropriate tone, hostile language, or disrespect directed toward any instructional staff or fellow student—particularly concerning assignments—will not be tolerated.

Any student who communicates disrespectfully about an assignment may receive a zero on that assignment. This applies regardless of the assignment's point value or context.

Artificial Intelligence Policy

We treat AI-based assistance, such as ChatGPT, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people in the class and with AI-based assistants.

However, **all work you submit must be your own. You should never include in your submissions anything that you did not write directly in your assignment.**

Including anything you did not write in your assignment will be treated as an academic misconduct case. If you are unsure where the line is between collaborating with AI and copying AI, we recommend the following heuristics:

Heuristic 1: Never hit “Copy” within your conversation with an AI assistant. You can copy your own work into your own conversation but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience.

Heuristic 2: Do not have your assignment and the AI agent open at the same time. Similar to the above, use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge.

This heuristic includes avoiding using AI directly integrated into your composition environment: just as you should not let a classmate write your solutions, you should also avoid using tools that directly add content to your submission.

Deviating from these heuristics does not automatically qualify as academic misconduct; however, following these heuristics essentially guarantees your collaboration will not cross the line into misconduct.

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Mental Health Resources

As a student, you may experience a range of issues that can cause barriers to learning. These might include strained relationships, anxiety, high levels of stress, feeling down, or loss of motivation. The Center for Assessment, Referral, and Education (CARE) may help you find the best resource to address issues you might experience over the semester. You can learn more about free mental health services available on campus by accessing their website <https://care.gatech.edu> [Links to an external site.](#). If you are experiencing a crisis, call 404-894-3498. Help is available 24 hours a day, seven days a week.