

GT 4801 Syllabus

Python for Visualization, 1 credit hour

Instructor Information

Instructor	Email	Office Hours & Location
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General Information

Description

Data visualization with Python is an introductory course for using Python for tasks leading up to data visualization and communication. This class will cover understanding data structure and different graphs and their applications, python skills for data wrangling, analysis and visualization.

Pre-Requisites

CS 1301 or CS 1315 or CS 1371

Course Goals and Learning Outcomes

The goal of the course is to familiarize students with data analysis using data analysis functions with Python. Upon successful completion of this course, you will be able to:

1. Understand basic Python logic and functions
2. Understand data structure
3. Understand how to import various data formats into a data frame in Python and manipulate it for analysis
4. Conduct basic statistical analysis with Python
5. Conduct basic visualization with Python
6. Use the final product to communicate with an audience

Course Requirements & Grading

The course is evaluated using letter grade grading. Points are awarded based on attendance, participation in the online discussion forums, weekly project checkpoints, and a group/individual project:

Assignment	Date	Weight (Percentage, points, etc)
Attendance and Participation	Weekly	25 points
Discussion Posts	Weekly	25 points
Project Checkpoints	Weeks 1-4	20 points
Overall Project		
Project	Week 5	25 points
Peer Review		5 points

Extra Credit Opportunities

A student may earn up to 10 points of extra credit by posting extra message about newly discovered tools / techniques / libraries useful in this course (5 pts each). To receive points students must write a up to 300 words explaining the application and steps taken towards it on the weekly post board.

Description of Graded Components

Attendance and participation: Up to 2.5 points per class session actively attended.

Online Discussion: Each week students will participate in an online discussion related to topics in data visualization with python, including ethical and design issues. (3pts / week). Students are also asked to respond to at least one question posted by classmates with shared experiences or resources (2 pt / week). Discussion posts are due by Friday, 11:30PM, and responses to other students due by Sunday, 11:30PM.

PROJECT

Projects in this class are individual-based. It is intended for every student to gain the experience of the whole process of a data-driven project.

Weekly project checkpoints will put into practice the skills you learn from the weekly workshops and help you progress toward the final project. You can earn 5 points for each checkpoint due at the end of weeks 1-4. Weekly project checkpoints will be due Sunday at 11:30PM, and instructors will provide feedback by the following Tuesday.

1. Week 1: Read the dataset selected by your instructor, write a narrative of 1 page explain what research question you want to answer with that data set; submit code of data input, reading, writing, output exercise with given datasets;
2. Week 2: Submit code of data formatting, write up a brief report of the issues you addressed with the code;
3. Week 3: Submit Python code of data analysis and interpret the results;
4. Week 4: Submit Python code of your data visualization and data model.

Detailed instructions about the weekly assignments will be posted on CANVAS and explained in details in class.

Overall project reports: For the overall project you will present an analysis of your data during the final week.

- Students enrolled in GT 4801 may do a written report, a presentation, or both

The overall project builds directly from the weekly project checkpoints.

1. Project Presentation
 - a. During the final week of class, each student will provide a 5-10 minute presentation on their data, research question, steps taken in Python, their results in visual form, and useful resources you discover in the research process.
 - b. Project Presentations will have the following sections:
 - i. Title

- ii. Description of the Data
- iii. Research Question
- iv. What you did in Python (e.g. tell us the model, libraries, and functions you used)
- v. What were your results (e.g. the output and visualization of the output of the model)
- vi. Bibliography

2. Project Document

- a. Final report in IEEE Conference Format 3-5 pages
<https://www.ieee.org/conferences/publishing/templates.html>
- b. Project Document will have the following sections:
 - 1. Abstract
 - 2. Introduction (1-2 pages): Research question, purpose of the study, audience, goal and paper organization
 - 3. Data structure and issues to address the research question
 - 4. Algorithms and graphs used in the study (1-2 pages)
 - 5. Python resources (1-2 pages) discovered and used in the project
 - 6. Results (no more than 1 page)
 - 7. Conclusions (1+ paragraphs)
 - 8. References / Credits

Constructive Feedback

Students will be asked to critique several final presentations/papers prepared by their colleagues and provide constructive feedback. You will be graded up to 5 pts for this feedback, and your feedback will be shared with your colleague.

Grading Scale

This course is offered as a Letter Grade:

A: 90-100

B: 80-90

C: 70-80

D: 60-70

F: < 60

Course Materials

Course Reference

There will be no required textbooks for this course. Over the weeks the instructor will share a series of tutorials, online documentation and forums to watch and read online. If you wish to read more in-depth about Python, the *Python Cookbook* is available at the GT Library:

https://gatech-primo.hosted.exlibrisgroup.com/permalink/f/1vgrnp4/01GALI_GIT_ALMA5131317946002947

Materials/Resources

Students are encouraged to download and install the Anaconda Distribution of Python on their own computers. Anaconda will preinstall many of the libraries that we will use in this class.

Anaconda: <https://www.anaconda.com/products/individual>

Course Website and Other Classroom Management Tools

Canvas Link: TBD

Course Expectations & Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Attendance and/or Participation

Attendance and participation are graded and recommended. Attendance includes attending the five-week classes and participating in the discussion forum. Participation includes following classroom hands-on exercise, discussion and posting and responding on CANVAS. If you cannot attend a class, please let the instructors know in advance, so that we can work out an alternative access to the workshop materials. Attendance is required for the last week of class.

Collaboration & Group Work

The course project is individual projects. It is intended for each student to go through a complete project cycle and have opportunities to work on every step in the process. However, discussion and communication among classmates are highly recommended. It is also beneficial if you could study together and help each other troubleshoot.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

This is a five-week class, and each phase builds from the prior week, so it is not recommended to fall behind. Weekly project checkpoints will receive a 20% penalty for each day submitted late. Late submission for the discussion posts is not permitted, nor can an extension be granted for the written and presentation components of the project.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Student Use of Mobile Devices in the Classroom

Most of the class is hands-on, you will spend class time coding along with discussion. Mobile phones should be on mute during the class, and if you need to have a conversation, please step out of the room. The exception is during the student project presentations where mobile devices should not be used.

Course Schedule

Date	Topic	Deliverables
Week 1	Intro to data structure Intro to Python and basic logic	Attendance, Discussion Post, Project checkpoint 1
Week 2	Exploratory Data Analysis with Python	Attendance, Discussion Post, Project checkpoint 2
Week 3	Data Models	Attendance, Discussion Post, Project checkpoint 3
Week 4	Data Visualization with Python Libraries	Attendance, discussion post, project checkpoint 4
Week 5	Communicating project results	Project Presentation and/or Written Report