

MSDS593 Exploratory Data Analysis and Visualization

Summer 2023

Instructor: Shan Wang

Class time: T/H 10-12 pm @ Room 104-106

Instructor contact info: Slack or email swang151@usfca.edu; Slack channel #summer-2023-EDA

Office hours (in-person): T/H 12-12:45 pm in classroom 104-106

Course Description

This course uses Python to provide a thorough introduction to exploring and visualizing data using statistics, charts, graphics and etc.. Other topics include advanced Python functionality and using statistical measures to communicate data concepts.

Course Materials

We will be using the following books available for free via the USF online library:

- [Storytelling with Data: A Data Visualization Guide for Business Professionals](#)
- [Storytelling with Data: Let's Practice](#)
- [Python for Data Analysis](#)
- Lecture notes and Notebooks are available on Canvas.

Course Topics

The course topics can be summarized to [Numpy and Pandas for EDA](#), [basic plotting in matplotlib](#), [visualization design and Implementation](#).

- Numpy and Pandas for EDA
 1. Pandas fundamentals
 2. More advanced functionalities
 3. EDA examples using real data
- Basic plotting in matplotlib

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1. Basic plots in matplotlib: bar chart, histogram, scatter, line, box, strip, violin, bubble plot, and etc.
 2. More topics on adjusting plots, axes, titles, labels and etc.
- Visualization design and implementation
 1. Principles of effective visualization design
 2. Visualization for different data types
 3. Storytelling with data
 4. Implement visualization in Python and communicate your results.

Course Objects

By the end of this course, students will be able to

- learn useful information or formulate new questions about a population based upon an associated data set.
- identify the story you want to present and create visualizations for it.
- improve or redesign existing visualizations
- communicate your findings from EDA and visualizations to broader audience.

Assessments

Attendance/Professionalism: 5%

Attendance is expected in all lectures in person. Valid excuses for absence with permission (see Attendance policy) will be accepted, but students are required to watch the lecture videos and submit class practice questions on Canvas if any, in 24 hours, before 3pm PDT next day. The attendance will be graded based on class practice submission. Students are required to attend all the quizzes. Make-up quizzes are not granted unless you provide official documents (like doctor's note) BEFORE the quiz time, and it will be considered case by case.

Professionalism is also, if not more, important:

- Showing respect for your classmates and your professor
- Getting to class on time every time
- No cellphones, email, social media, slack, texting during the class
- Turn off all of your various notifications so you are not distracted
- Mute all your devices, including the laptop speaker.
- **Do not share course videos or materials publicly unless you get permissions to do so.**
- **Don't cheat.**

Homework: 30%

You will be assigned homework assignments to be completed and turned in on Canvas on Tuesdays before midnight (11:59 pm PDT). The submission of homework required two file: a .pdf file including all your answers (and code if asked in the question), and a Python file including all your code.

Homework 1	Homework 2	Homework 3	Homework 4
Tue 07/11	Tue 07/18	Tue 07/25	Tue 08/1

Quizzes: 40%

There will be 2 quizzes on Tuesdays bi-weekly from 9-10am. Each quiz will be available on Canvas but you will take it in-person in our classroom. Once start, you will have **30-60 minutes** to finish and submit the quiz on Canvas. The instruction of each quiz (including what lectures are covered, open-book or not and etc.) will be announced on Slack and Canvas before the quiz.

Quiz 1	Quiz 2
Tue 07/18	Tue 08/01

Final group project: 25%

- There will be a final group project in this course. Your ability to research resources online, design EDA and visualization, and communicate your results with an oral presentation will be tested.
- You will work in groups of size three or four, and group members will be randomly assigned and non-negotiable. You can find your group on Canvas-People-Project.
- The presentation file will be due before midnight of Monday, 08/07. The presentations will be held during the last week of class (08/08 and 08/10).
- Your grade will be based on peer review, final report, and the presentation. The detailed outline will be posted on Canvas after the module starts.

Presentation Submission	Oral Presentations
Due Monday 08/07, 11:59pm	In class 08/08 and 08/10

Grading Policies

Attendance	5%
Homework	30%
Quizzes	40%
Final project	25%

All the coding part from homework, quizzes and project will be run for similarity. Students who are found with big portion of same codes will be investigated as violating USF academic integrity policy.

Grading Scale

A+: 97-100	A: 93-96	A-: 90-92
B+: 87-89	B: 83-86	B-: 80-82
C+: 77-79	C: 73-76	C-: 70-72
F: below 70		

The scaled might be adjusted based on the class performance.

Course Policies

Attendance policy

Please refer to the attendance grading. All students are expected to participate in the in-person modality unless granted permission for the remote modality by the MSDS program's administrative and academic directors. Permission for the remote modality is only being granted to incoming international students with documented visa and/or travel issues.

Program information

MS in Data Science program learning outcomes and course requirements: https://catalog.usfca.edu/preview_program.php?catoid=22&poid=13078

Students with Disabilities.

The University of San Francisco is committed to providing equal access to students with disabilities. If you are a student with a disability, or if you think you may have a disability, please contact Student Disability Services (SDS) at sds@usfca.edu or 415 422-2613, to speak with a disability specialist. (All communication with SDS is private and confidential.) If you are eligible for accommodations, please request that your accommodation letter be sent to me as soon as possible; Students should contact SDS **at the beginning of the semester**. ****Accommodations are not retroactive****. For more information please visit the SDS website: <https://www.usfca.edu/student-disability-services>.

Behavioral Expectations

All students are expected to behave in accordance with the Student Conduct Code and other University policies (see <http://www.usfca.edu/fogcutter/>). Students whose behavior is disruptive or who fail to comply with the instructor may be dismissed from the class for the remainder of the class period and may need to meet with the instructor or Dean prior to returning to the next class period. If necessary, referrals may also be made to the Student Conduct process for violations of the Student Conduct Code.

Illnesses and Emergencies

If you fall ill or have an emergency (personal or otherwise) that significantly affects your ability to complete an assignment or take an exam, you must notify the instructor before the task or artifact is due. Do not simply skip

an exam or an assignment and say you were sick after the fact. Always make arrangements with the instructor beforehand, rather than declaring illness or emergency later. ****Accommodations are not retroactive****. Illness and emergency related situations must be disclosed to both the instructor and program director in writing. Illness-related issues must be accompanied by a doctor's note.

Withdraws and Incomplete

Students who withdraw or take a leave of absence from the university on or after the first day of the semester must comply with the official USF Withdrawal or Leave of Absence policy. A pro-rated (i.e., 80%) refund of tuition charges (<https://myusf.usfca.edu/billing-tuition/refunds#withdrawal>) will be applied for students withdrawing or taking a leave of absence by July 8, 2022. Withdrawals or leaves of absences taken before the first day of boot camp will generally be honored with a 100% refund of tuition charges.

Academic Integrity.

As a Jesuit institution committed to *cura personalis* – the care and education of the whole person – USF has an obligation to embody and foster the values of honesty and integrity. USF upholds the standards of honesty and integrity from all members of the academic community. All students are expected to know and adhere to the University's Honor Code. You can find the full text of the code online at <http://myusf.usfca.edu/academic-integrity/>. The policy covers:

- Plagiarism – intentionally or unintentionally representing the words or ideas of another person as your own; failure to properly cite references; manufacturing references.
- Working with another person when independent work is required.
- Submitting work written by another person or obtained from the internet.
- The penalties for violation of the policy may include a failing grade on the assignment, a failing grade in the course, and/or a referral to the Academic Integrity Committee.

Counseling and Psychological Services (CAPS).

CAPS' diverse staff offers brief individual, couple, and group counseling to student members of our community. CAPS services are confidential and free of charge. Call (415) 422-6352 for an initial consultation appointment. Telephone consultation through CAPS After Hours is available Monday - Friday from 5:00 p.m. to 8:30 a.m., 24 hours during weekends and holidays; call the above number and press 2. Further information can be found at <https://myusf.usfca.edu/student-health-safety/caps>.

Confidentiality, Mandatory Reporting, and Sexual Assault.

As instructors, one of our responsibilities is to help create a safe learning environment on our campus. We also have a mandatory reporting responsibility related to our role as faculty. We are required to share information regarding sexual misconduct or information about a crime that may have occurred on USF's campus with the University. Here are some useful resources related to sexual misconduct:

- To report any sexual misconduct, students may visit the Title IX coordinator (UC 5th floor) or see many other options by visiting usfca.edu/student_life/safer.
- Students may speak to someone confidentially or report a sexual assault confidentially by contacting Counseling and Psychological Services at (415) 422-6352.
- To find out more about reporting a sexual assault at USF, visit USFs Callisto website at: usfca.callistocampus.org.
- For an off-campus resource, contact San Francisco Women Against Rape (SFWAR) (415) 647-7273 (sfwar.org).