**STAT 4500 Section [001]**

**Data Visualization**

**Fall 2024 CRN: [11578]**

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Class Schedule: [MW] [8:00-9:15] (75 minutes, period 1)

Class Room: GH 115 Goodwyn Hall

Instructor: Yi Wang

## **Office**: Goodwyn 213D

**Phone:** 334 244 3318

**E-mail**: ywang2@aum.edu

**Office Hours**: M/T 4:00 pm-5:00 pm or by appointment

**Important Dates:**

[08/19/2024] Class begins

[09/02-09/03, 2024] Labor Day (or MLK) holiday & student holiday!

[day] [month] [date], [time span] Midterm Exam (TBD)

[11/11/2024] Last day to drop classes with a ‘W’

[11/25-29, 2024] Thanksgiving holiday (or Spring break)!

[11/13-27, 2024] Curtiss on-line Course evaluations

[12/02/2024] Last day of M/W classes

[12/03/2024] Last day of T/R

[Mon] [12] [09], [8:00-10:30am] Final Exam

**Textbook and Codes:** The following textbooks are required.

[1] Jake VanderPlas. *Python Data Science Handbook*. 2nd ed. O’Reilly, 2023.

The book is free at <https://jakevdp.github.io/PythonDataScienceHandbook/>.

You should clone the code repository at <https://github.com/jakevdp/PythonDataScienceHandbook>, and have Python computing environments set up on your computer.

[Instruction]: <https://ywanglab.github.io/stat4500/intro.html>

[2] Jonathan Schwablish: Better Data visualization. Columbia University, 2021.

[3] Some lecture notes may be posted at <https://ywanglab.github.io/>.

**Prerequisites:**  STAT 3000 or STAT 1010. Students are expected to be familiar with basic levels of Python or R programming.

**Catalog Description:** Introducesdata visualization techniques and exploratory data analysis. Real-world case studies are presented via coding using a data visualization package for the statistical programming language R (Python). Topics include creating and interpreting these visualizations, assessing the effectiveness of different visualizations, and presenting results in reproducible data science reports.

**Learning Objectives:** At the end of the semester, students will be trained to

* Apply data visualization principles to communicate data-driven findings;
  + Assess the effectiveness of different visualizations
  + Identify common mistakes and why you should avoid them
  + Best Practices (examples)
* Create and interpret data visualizations and tables
  + Use Python programming tools to create basic and advanced data plots
  + Apply the visualization technique to real-world cases
  + Create an appealing table
* Design and redesign effective visualization
  + Develop a data visualization style guide
  + Redesign visualization
* Create reproducible data science reports with visualization
  + Use Quarto authoring software to create a reproducible report

**To be successful in this course, you will**

1. **Pre-read each chapter before coming to each lecture**
2. **Review lecture notes after the lecture**
3. **Complete each ungraded lab solidly**
4. **Complete homework Assignments.**

**Methods of Instruction:** The format of class meetings will consist of lectures and in-class discussions. Student participation is highly encouraged.

**Programming language**: Python programming package (Free open source)

**Grading Policy**:

|  |  |
| --- | --- |
| Homework, in-class Quizzes, Projects | 75 % |
| Final | 25% |
| Total | 100% |

No grade or performance will be discussed over the telephone or via email. You must do so in person.

|  |  |
| --- | --- |
| [90%,100%] and 90% on Final | A |
| [86%,90%) and 86% on Final | B+ |
| [79%, 86%) and 79% on Final | B |
| [75%, 79%) | C+ |
| [65%, 75%) | C |
| [60%, 65%) | D+ |
| [55%, 60%) | D |
| [0%, 55%) | F |
| Missing an exam OR 4 or more absences | FA |

**No other factors, such as needing the course for graduation, will be considered.**

**Make-up policy**: If you have a **written official excuse**, subject to my approval, you may make up a missing test or replace it with the final at my discretion.Assignments must be turned in at the designated period. All submissions will be on time. No make-up of any missing quizzes. Requests for makeup for an exam are ONLY allowed for the reasons outlined in the AUM Attendance Policy and must be justified with an official written excuse:

1. official university events **with excuses provided in advance** by the head of the University unit involved (e.g., for intercollegiate athletic matches, required academic events/academic travel)
2. student illness/medical emergency or medical emergency for a member of the student’s immediate family
3. death of a member of the student’s immediate family
4. military orders (**notification should occur prior to the absence**)
5. jury duty or court subpoena (**notification should occur prior to the absence**)
6. religious holiday (**notification should occur prior to the absence**)
7. weather emergencies or perilous driving conditions (with notification if feasible)

The student should initiate the makeup exam by contacting their instructor, preferably before the absence. Your instructor will then verify the written excuse and set up the makeup exam date/time.

**Midterm Grade:** Your midterm grade will consist of the weighted average of quizzes, projects, and exams graded to date using the previously designated weights. *This grade is only meant to estimate current progress in the class and can be quite different from your final course grade.*

**Canvas**: Students may seek assistance with technology from the ITS Help Desk located in the computer lab on the first floor of the Taylor Center. You may also call 334-244-3500 or email [helpdesk@aum.edu](mailto:helpdesk@aum.edu).

**Attendance**: Class attendance is mandatory. Attendance will be checked. Please bring copies of any documentation regarding your absences, like doctor’s notes, court summons, obituaries, funeral programs, etc. A student is considered absent if he/she comes in late or leaves early. **Students are responsible for catching up with material they may miss due to absences**. A grade of FA will be issued for students with six or more absences OR students who fail to take the final exam.

**Classroom Behavior**: Patterns of disruptive behavior that obstruct or disrupt the teaching/learning process will not be tolerated. I would appreciate it if mobile phones or pagers were turned off or switched to vibration during class meetings. **All cell phones must be ringed off/turned off during tests and the final exam.**

Please always be courteous to your fellow students and the instructor. Do not converse with other students, read the newspaper, or sleep during lectures.

Children should not be brought to class except in emergencies and only with the instructor's permission.

Food, drinks, or gum should not be brought into the classroom.

AUM prohibits smoking in campus buildings. If you smoke, you may only do so outside the buildings.

**Electronic Devices**: Cell phones, computers, tablets, and other electronic devices (except approved calculators) should be powered off, set to emit no audible sound, and put away during class. Cell phones used for any purpose during class violate class policy. If you must answer a cell phone call during class, please quietly leave the classroom and move to a location where your conversation does not disrupt class progress.

**Academic Integrity**: Anyone involved in plagiarism/cheating will be given a zero for that assignment, quiz, mid-term, or final exam. **All instances of academic dishonesty will be reported to the administrator(s)**. You can discuss your assignments with your classmates but cannot copy (totally or partially) someone else's work or allow someone to copy your solution. Students are expected to maintain academic integrity in all work in this course. See the *AUM Graduate Catalog* for details. Procedures for violations are outlined in the *AUMANAC.* Cheating of any form is not tolerated, and violators will be punished on a case-by-case basis.

**Disability Accommodations**: Students who need accommodation are asked to arrange a meeting during office hours to discuss their accommodations. An alternate time can be arranged if you have a conflict with my office hours. To set up this meeting, please contact me by e-mail. If you have not registered for accommodation services through the Center for Disability Services (CDS), but need accommodations, make an appointment with CDS, 147 Taylor Center, or call 334-244-3631 or e-mail CDS at [cds@aum.edu](mailto:cds@aum.edu).

**Free Academic Support**: All students can receive free academic support at AUM. Visit the Learning Center (LC) in the WASC on the second-floor Library or the Instructional Support Lab (ISL) in 203 Goodwyn Hall. The LC, ISL offers writing consulting and tutoring in almost every class through graduate school. The LC may be reached at 244-3470 (call or walk in for a session), and the ISL may be reached at 244-3265. ISL tutoring is first-come-first-served. Current operating hours can be found at [www.aum.edu/learningcenter](http://www.aum.edu/learningcenter).

**Course Evaluation Date**: [11/12/2024-12/3/2024]. During the scheduled course evaluation period, students can complete course evaluations online using their mobile devices, tablets, laptops, or other appropriate devices.

**Tentative Schedule (subject to change)**

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| --- | --- | --- |
| Topic | Assessment | Number of Weeks |
| **Module 1**: Data Visualization Principles | Kick-off semester-long project Reading chapters 1, 2, 3 [2]  Quiz 1 | 2 weeks |
| Chapters 1,2 [2] | W1 |
| Chapter 3 [2] Some Best Practices [Instructor Notes] | W2 |
| **Module 2**: Create and Interpret Basic Charts (Python)  Chapter 4 [1]  Chapters 4-10 [2]  Advanced Visualization Techniques (Python) [Instructor Notes]  Create Appealing Tables [2] Chapter 11 | Reading chapter 4 [1] Reading chapters 4-11 [2]  Project 1: line plots  Project 2: Scatter plots  **Quiz 2**  Project 3: Error bars  Project 4:Density and Contour Plots  Project 5: Histograms and Binnings  **Quiz 3**  Project 6:Customizing Legends  Project 7: Customizing Color bars  **Quiz 4**  Project 8: Multiple Subplots  Project 9: Text and Annotation  Project 10: Customizing Ticks  Project 11: Settings and Stylesheets  **Quiz 5**  Project 12: three-dimensional Plotting  **Quiz 6**  Project 13: Visualization with Seaborn  **Quiz 7**  **Quiz 8** | 9 weeks  W3  W4  W5    W6  W7  W8  W9  W10  W11 |
| **Module 3**: Design and Redesign Visualization | Reading chapters 12, 13 [2] | 2 weeks |
| Chapter 12 [2] |  | W12 |
| Chapter 13 [2] |  | W13 |
| **Module 4**: Create Reproducible Report [Instructor notes] |  | 1 week |
| Use Quarto authoring software to create a reproducible report. | Finishing up a semester-long project | W14 |
|  | **Semester-long project due**  **Final Exam** | Dec. 08 8:00am-10:30am Dec. 09 |