STAT 633 Data Visualization – Spring 2024 – 3 Credits

Instructor: Shai Gorsky

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Synchronous (required) Class Meetings:

Wednesdays, 6:00-8:30pm.
Class meetings will be held in Room 105, School of Design, **Mount Ida Campus**.
Students may also attend class meetings synchronously via **Zoom**.
Zoom Meeting ID: **952 3500 9519**
Students must login to Zoom with their institutional accounts.
Students are asked to join class meetings with cameras ON.

Online Office Hours:

Class days 4:00-5:00pm, or by appointment (use this resource!)
Zoom Meeting ID: 595 479 5295 (personal meeting room)

Examination Schedule:

There is no midterm exam for this class. Tentative dates for **student group presentations** are March 13 and April 24, 2024, 6:00-8:30pm (during class time)

Final Group Presentation (in class / via Zoom):
Wednesday, May 15, 2024, 6:00-8:00pm (during final exams week)

Required Materials: Class lecture notes

Reference Books:

Interactive Web-Based Data Visualization with R, plotly, and shiny, Carson Sievert, 2020, CRC press, ISBN 978-1138331457
Freely available at: https://plotly-r.com/

Additional reading assignments will be posted.

Course Description:
The class will focus on data visualization methods - the art of informing results and presenting findings in a structured way. Data visualization is a part of the data analysis process; the choice of visualization methods and how they are viewed can have an important influence on any conclusions drawn from data analysis. We will learn how to generate informative, engaging, and reproducible interactive graphics.

Learning Objectives:
We will gain insight and skills for generating interactive and dynamic graphics for data analysis from R. The tidyverse library will provide much of the basic functionality that we will utilize. We will touch on exploratory data analysis, data cleaning, examining features of data structures, detecting unusual data patterns, and determining trends. We will learn how to use the plotly package to render our graphics interactive, and further augment our work with R-shiny to create sophisticated data visualization apps.

Prerequisites:
Probability and Statistics at a calculus-based level such as Stat 607 and Stat 608 (concurrent) or Stat 515 and Stat 516 (concurrent).

Note: Prior experience with R/Python/Matlab is strongly recommended.

The class is open to Graduate Students but Undergraduates can enroll with instructor's permission.

Course Requirements:
1. Attendance is expected at the time class is held. If you cannot attend at the class time (due to time zone issues or other issues), please contact the instructor.
2. Zoom sessions will be recorded, transcribed, and posted on Moodle.
3. One of two types of weekly assignments will be required. Either (a) **written computer assignments** that are due before class, or (b) **short small-group in-class presentations** that will be held periodically during class meetings. No late assignments will be accepted except for legitimate reasons.
4. Discussion of the written computer assignments with fellow students is encouraged. However, the code and the final report must be your own.
5. The final project will consist of group presentations.

Grading Criteria

Assignments and in-class presentations (60%, the assignment with the lowest grade will not be counted), final project & presentation (40%).

Grading scale: A (90-100), A- (88-89), B+ (85-87), B (81-84), B- (78-80), C+ (75-77), C (71-74), C- (66-70), D+(61-65), D (56-60), F (0-55)

Tentative weekly schedule:

The following is a list of topics to be covered in class, approximately week by week. Some topics will be covered in a single class, depending on class interests and needs. Additional topics may be added according to class interests and needs. Two class meetings will be devoted to student presentations.

Week 1: Introduction
Week 2: dplyr, tidyr
Week 3: Visualizing distributions
Week 4: ggplot2; Introduction to R shiny
Week 5: Introduction to plotly
Week 6: Student group presentations
Week 7: Plotly foundations
Week 8: Interactive maps
Week 9: Visualizing Networks
Week 10: 3d charts; Arranging views; Parallel coordinate plot (and radar)
Week 11: Student group presentations
Week 12: Advanced shiny; Server side linking of plotly with shiny
Week 13: Introduction to Javascript

Make-up Policy:

Students who are absent due to excusable extenuating circumstances remain responsible for meeting all class requirements and contacting me in a timely fashion about making up missed work. I will offer such students reasonable assistance in making up missed class materials and offer mutually agreeable alternatives to make up work.

Accommodation Statement:

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Academic Honesty Statement:

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has

committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent.
(http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).

Chegg, Discord and other online help resources:

Seeking answers from any website is a clear violation of the academic honesty policy, while submitting course materials to these sites or similar ones is a violation of the instructor's copyright. Instructors may be monitoring such websites throughout the semester.

Names and Pronouns:

Everyone has the right to be addressed by the name and pronouns that they use for themselves. Students can indicate their preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. Please let me know what name and pronouns I should use for you if they are not on the roster. A student's chosen name and pronouns are respected at all times in the classroom.

Title IX Statement:

In accordance with Title IX of the Education Amendments of 1972 that prohibits gender-based discrimination in educational settings that receive federal funds, the University of Massachusetts Amherst is committed to providing a safe learning environment for all students, free from all forms of discrimination, including sexual assault, sexual harassment, domestic violence, dating violence, stalking, and retaliation. This includes interactions in person or online through digital platforms and social media. Title IX also protects against discrimination on the basis of pregnancy, childbirth, false pregnancy, miscarriage, abortion, or related conditions, including recovery. There are resources here on campus to support you. A summary of the available Title IX resources (confidential and non-confidential) can be found at the following link: https://www.umass.edu/titleix/resources. You do not need to make a formal report to access them. If you need immediate support, you are not alone. Free and confidential support is available 24 hours a day / 7 days a week / 365 days a year at the SASA Hotline 413-545-0800.