CS9.422 Behavioral Research: Statistical Methods

Course Information

Instructor Information

Instructors: Dr Vinoo Alluri and Dr Vishnu Sreekumar
with guest lectures by Dr Bhaktee Dongaonkar
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Day/Time: Mondays and Thursdays: 11:40 pm – 1:00 pm (Spring 2024)
Location: **SH1**
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Course Information

Course Description: Students will be introduced to the different statistical methods employed in the analysis of behavioral data. The material will be delivered as a combination of lectures and practical sessions. In the practical sessions, students will be provided with data and code snippets to help them practice the concepts taught in the lectures. They will also receive regular problem sets/assignments which will comprise the majority of the course evaluation. We will primarily rely on R for statistical analysis but may also use other tools as deemed appropriate for the material being covered.
Credits: 4
L-T-P: 3-0-1 (L = lecture hours, T = tutorial hours, P = practical hours)
Prerequisite: None

Textbook & Course Materials

Recommended Texts & Other Readings: Learning Statistics with R by Danielle Navarro: https://learningstatisticswithr.com/lsr-0.6.pdf
Lecture slides and supplementary reading materials (journal articles, books/book chapters, online resources) will be uploaded on the course page on Moodle.

Course Technology Requirements

- You will need access to the following tools to participate in this course.
    - Laptop computer to bring to class for practical sessions
    - Webcam (if attending online)
    - Microphone (if attending online)
    - a stable internet connection (don't rely on cellular)

Course Structure

This course will be delivered as in-person lectures and practical sessions.

Student Expectations

In this course you will be expected to complete the following types of tasks.

- Read the syllabus!
- Meet deadlines
- Attend in-person classes
- Participate in practical sessions every week
- Submit your practical class-work every week
- Communicate via email
- Complete basic internet searches
- Download and upload documents to the course site on Moodle
- read documents online
- view online videos
- participate in class discussions
- complete quizzes/tests
- upload documents to a Dropbox/Moodle

Expected Instructor/TA Response Times

- We will attempt to respond to student emails within 24 hours. If you have not received a reply from us within 24 hours, please resend your email. Please email both of us to maximize the probability of a quick response.
    - ***If you have a general course question (not confidential or personal in nature), please post it to the Course Q&A Discussion Forum found on the course homepage on Moodle. We will post answers to all general questions there

so that all students can view them. Students are encouraged to answer each other's questions too.
    - We will attempt to reply to and assess student discussion posts within 48 hours.

Course Outcomes (COs)

After successful completion of this course, students will be able to:

- CO-1: develop an understanding of various experimental designs
- CO-2: recognize and employ appropriate statistical packages to analyze data
- CO-3: apply appropriate parametric and non-parametric analyses techniques
- CO-4: perform exploratory data analysis and examine intrinsic relationships between variables
- CO-5: reflect and draw appropriate inferences post analyses
- CO-6: create custom code by adapting exploratory and confirmatory analyses techniques

You will meet the outcomes listed above through a combination of the following activities in this course:

- Attend lectures and participate in class discussions (CO-1, CO-2, CO-3, CO-4, CO-5)
- Quiz 1 and Quiz 2 (CO-1, CO-2, CO-5)
- Complete problem sets and assignments (CO-2, CO-3, CO4, CO-5, CO-6)
- Complete a course project and present the results (CO-3, CO-4, CO-5, CO-6)

Tentative Schedule

Week 1: Introduction: why do statistics, and basics of research design
Week 2: Installing R and basics of R
Week 3: Descriptive statistics and visualizing data
Week 4: Organizing, sorting, merging, and reading data in R
Week 5: Probability and sampling distributions
Week 6: Null hypothesis testing
Week 7: Categorical data analysis, comparing two means, data reduction

Week 8: Linear regression, regression diagnostics, and related hypothesis tests
Week 9: One-way ANOVA
Week 10: Factorial ANOVA
Week 11: Bayesian statistics and inference
Week 12: Project presentations and report submission

Grading Policies

Graded Course Activities

Description	Percentage
In-class problem sets	10
4 assignments (10% each)	40
2 Quizzes (10% each)	20
Final Project	30
Total	100

In-class problem sets

We will provide sample datasets and problems to work on in class, and code snippets to facilitate them. You are highly encouraged to use Google Search during the practical sessions when analyzing data using R. Students are expected to attend all the practical sessions and submit their answers at the end of the class (10% weightage).

Assignments

Students will have to submit code and solutions to 4 assignments. Plagiarism will result in 0 marks and the students will also be reported to the administration. If you have queries about what constitutes plagiarism, please read: https://mrwachs.wordpress.com/2019/11/25/what-is-plagiarism-in-computer-science/, https://clas.iusb.edu/computer-science-informatics/prospective-students/plagiarism.html, and also contact the instructors by email with your questions.

If you are stuck on a problem, brain-storming with a friend or group of friends is encouraged but not looking at their code and copying their code

and logic. The latter will result in 0 marks awarded for the assignment, and a letter grade penalty for each further infraction.

Final Project (60 marks, 30% weightage)

You can start working on the project at any point during the course, the earlier, the better. You can pick any paper from the behavioral sciences and either conduct a replication study by collecting your own data, or use data shared by the authors of the paper to replicate their analysis using your own custom analysis code demonstrating any technique taught in the course and/or other statistical techniques of your choice depending on the problem statement. There will be three main components of the final project: 1. A project proposal 2. A final project presentation in class and 3. A final project write-up. They will be graded as follows:

2-3 page (single-spaced, font size 12) project proposal **to be submitted by midnight Feb 15, 2024** (initial topic selection, with brief description of what you intend to study, how you plan to collect data, how the analysis will be performed, and what the data analysis is expected to teach us about that topic) – 10 marks

Final Presentation – 15 marks (clarity of presentation: setting up the problem, describing the experiment/data = 10 marks; visualization of the results and conclusions = 5 marks)

Final Project Write-up (~10 pages, single-spaced, font size 12) **to be submitted by midnight April 25, 2024**

1. Introduction and clarity of problem statement, including an appropriate literature review – 5 marks
2. Methods (the analysis you did must be clear from the methods section) – 10 marks
3. Results (make good figures, use statistics to make your points about what you present in the figures) – 10 marks
4. Conclusion and Discussion – 5 marks
5. Formatting, citations, references – 5 marks

Participation

Students are expected to participate in all class activities as listed on the course calendar. *Failure to participate will result in students being unable to complete the in-class problem sets, assignments, and project satisfactorily and any such resulting effect on the final grade is entirely the student's responsibility.*

Complete Assignments

All assignments for this course will be submitted electronically

through the course page on Moodle unless otherwise instructed. Assignments must be submitted by the given deadline or special permission must be requested from instructor *before the due date*. Extensions will not be given beyond the next assignment except under extreme circumstances.

Late or missing assignments will affect the student's grade.

Late Work Policy

Be sure to pay close attention to deadlines—there will be no make-up assignments or quizzes, or late work accepted without a serious and compelling reason and instructor approval.

Viewing Grades on Moodle

Points you receive for graded activities will be posted to the course page on Moodle. Click on the Grades link to view your points.

Grading

Absolute grading will be followed if the size of the class is <60 and relative grading otherwise. Final scores will be rounded up and graded accordingly.

Course Policies

Netiquette Guidelines

Netiquette is a set of rules for behaving properly online. Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Working as a community of learners, we can build a polite and respectful course community.

The following netiquette tips will enhance the learning experience for everyone in the course:

- Do not dominate any discussion.
- Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Never make fun of someone's ability to read or write.
- Share tips with other students.

- Keep an "open-mind" and be willing to express even your minority opinion. Minority opinions have to be respected.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.
- Always assume good intentions and ask for clarification. Communication online is difficult without facial and gestural cues.

Adapted from:

Mintu-Wimsatt, A., Kernek, C., & Lozada, H. R. (2010). *Netiquette: Make it part of your syllabus*. Journal of Online Learning and Teaching, 6(1). Retrieved from http://jolt.merlot.org/vol6no1/mintu-wimsatt_0310.htm

Shea, V. (1994). Netiquette. Albion.com. Retrieved from: http://www.albion.com/netiquette/book/.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that we can help you find a solution.

Inform Your Instructor of Any Accommodations Needed

If you have a documented disability and wish to discuss academic accommodations, please contact your instructors as soon as possible.

Statement of Policy

The instructors of this course will modify requirements as necessary to ensure that they do not discriminate against qualified students with disabilities. The modifications should not affect the substance of educational programs or compromise academic standards; nor should they intrude upon academic freedom. Examinations or other procedures used for evaluating students' academic achievements may be adapted. The results of such evaluation must demonstrate the student's achievement in the academic activity, rather than describe his/her disability.

If modifications are required due to a disability, please inform the instructor

Commit to Integrity

As a student in this course (and at IIIT Hyderabad) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom.

IIIT Hyderabad Academic Honesty Policy & Procedures

Student Academic Disciplinary Procedures

(1) Academic misconduct is an act in which a student:

(a) Seeks to claim credit for the work or efforts of another without authorization or citation;

(b) Uses unauthorized materials or fabricated data in any academic exercise;

(c) Forges or falsifies academic documents or records;

(d) Intentionally impedes or damages the academic work of others;

(e) Engages in conduct aimed at making false representation of a student's academic performance; or

(f) Assists other students in any of these acts.

(2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

We will be using plagiarism detection software. Please do not copy-paste from other papers. If you use direct quotes, you have to use the

quotation marks “xyz” and cite your source: e.g. (Johnson & Johnson, 1988, p. 5). Please use APA format. If plagiarism is detected, you will lose the 10 marks assigned to formatting and you will be advised regarding plagiarism. If plagiarism is detected a second time in another assignment/project write-up, then one letter grade will be deducted from the final grade (e.g.[1] if you get a B, that will be changed to C) and you will be reported to the appropriate authorities for further disciplinary action.

Note: This syllabus was adapted from a template provided at www.uwsp.edu

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