Jindal School of Management
Course Syllabus
Fall 2024

Course Information

Course Number: BUAN/OPRE 6359.501
Course Title: Advanced Statistics for Data Science
Class Meeting: Tuesdays, 7 pm – 9:45 pm, JSOM 1.217

Instructor Contact Information

Instructor: Rasoul Ramezani
Email: rasoul.ramezani@utdallas.edu
Please write the course and the section number in the subject line.
Student Hours: Tuesdays, 4 pm – 6 pm, JSOM 3.427
Please feel free to drop in. If these hours don't work for you, please let me know, and we can find another time to meet.

TA Contact Information

TA: Trung (David) Nguyen
Email: tbn140130@utdallas.edu
Please write the course and the section number in the subject line.
Student Hours: Mondays, 4:30 pm – 6:30 pm (online via MS Teams, Click Here)

Course Description

This course uses statistical methods to analyze data from observational studies and experimental designs to communicate results to a business audience. The course mandates prior knowledge of fundamental statistical concepts such as measures of the central location, standard deviations, histograms, and Normal and t-distributions (knowledge of calculus is not required). The course also emphasizes interpretation, inference, and computation using a statistical package R.

Student Learning Objectives/Outcomes

I will do my best to use approaches that encourage active participation, and I hope you take advantage of them because I have found that they are the best way to engage you in learning. Class sessions will consist primarily of lectures, with some discussions and in-class exercises related to the covered topic. This course involves a lot of computation, and there is no substitute for getting your hands dirty. In data analysis, you learn as much when things "don't work" as when they go as planned. This is not an R course but a Statistics course, and we will use this package as a tool to achieve the course objectives.
Learning outcomes – upon completion of this course, you will be able to accomplish the following:

1. Develop and test hypotheses using multiple statistical methods.
2. Understand the differences between observational and experimental studies.
3. Learn how randomization and sampling influence the scope of inference.

4. Explore experimental and observational designs that compare multiple populations when the response is continuous or binary.
5. Communicate the findings of statistical analysis from these new methods in a clear, concise, and scientific manner.
6. Integrate and analyze real-world datasets using common software packages.

Course Materials

- **Recommended Textbooks:**
  1. Ramsey, F. L., and Schafer, D. W. (2013). *The Statistical Sleuth: A Course in Methods of Data Analysis (3rd Ed)*. Cengage Learning.
  2. Hill, Griffiths, Lim (2018). *Principles of Econometrics (5th Ed).*
  3. Keller, G. (2017). *Statistics for Management and Economics (11th Ed).*
  4. Davies, T. (2016). *The Book of R: A First Course in Programming and Statistics (1st Ed)*
- **Required Software/ Program:** R & R-Studio

  Please ensure you bring your laptop to every class.

Communication

- **eLearning:** Class materials will be posted on the course page in eLearning. Please ensure you read the emails and announcements I send via eLearning.
- **Meetings:** We can meet regularly during the scheduled student hours (mentioned above) to discuss your questions.
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Updated Topics and Tentative Academic and Assignments Calendar

Week	Week of	Topics	Assignment	Due Date
Syllabus Quiz: Online on eLearning by Sunday, Aug 25th, at 11:59 pm.				
Week 1	Aug 19	Syllabus review/ quiz Installing R, R basics Tabular and Graphical Descriptives – Nominal Data	HW 1	Sep 1
Week 2	Aug 26	Tabular and Graphical Descriptives – Interval Data Numerical Descriptives – Interval Data		
Week 3	Sep 2	Probability & Probability Rules Discrete Probability Distributions	HW 2	Sep 15
Week 4	Sep 9	Discrete Probability Distributions (con't) Continuous Probability Distributions	HW 3	Sep 22
Week 5	Sep 16	Sampling Distribution and Confidence Interval		
Week 6	Sep 23	**Exam 1:** Online on eLearning between Sep 23 and Sep 27 in the Testing Center.		
Week 7	Sep 30	Hypothesis Testing One-sample t-Test	HW 4	Oct 20
Week 8	Oct 7	Paired and Two-sampe t-Tests Log Transformations		
Week 9	Oct 14	Log Transformations (con't) Analysis of Variance (NOVA) & Tukey-Kramer Procedure		
Week 10	Oct 21	**Exam 2:** Online on eLearning between Oct 21 and Oct 25 in the Testing Center.		
Week 11	Oct 28	Simple Linear Regression (SLR)	HW 5	Nov 10

Week 12	Nov 4	Log Transformation in SLR Multiple Linear Regression (MLR)	HW 6	Nov 17
Week 13	Nov 11	Making Inferences in MLR		
Week 14	Nov 18	Data Refinement & Variables Selection	HW 7 (optional for extra credit) Peer Evaluation	Dec 1
Week 15	Nov 25	Fall Break – No Class		
Week 16	Dec 2	**Exam 3:** Online on eLearning between Dec 2 and Dec 3 in the Testing Center.		

- Notes:
  1. This timeline is tentative and may be adjusted. Lectures might overlap between classes.
  2. Assignments are due by midnight on the specified date. These deadlines are set to help you achieve all course objectives by the end of the semester. Please plan to complete and submit all assignments on time. You may submit up to 12 hours late for partial credit if you miss a deadline.

Grading Scheme

Assignments	Exam 1	Exam 2	Exam 3	Syllabus Quiz
30%	23%	23%	23%	1%

≥ 91	A	83-86	B	70-75	C
89-91	A-	79-83	B-	< 70	F
86-89	B+	75-79	C+		

Course Policies

Assignments

- Six homework assignments, each carrying equal weight, will be assigned.
- An optional homework assignment will be available for extra credit. The instructor will determine the extra credit points.
- Homework assignments should be completed in groups of five students.
- The instructor randomly assigns students to groups.
- Students are responsible for contacting their group members to arrange further details.
- All team members share collective responsibility for the assignments throughout the semester.
- Each team must designate a leader responsible for submitting the following on e-learning: (1) the typed homework solutions in PDF format and (2) a single R file containing the R scripts for all questions.
- On the cover page of each submission, please include the following information:
  - Participating Members:
    1. ...
    2. ...
    3. ...
  - Non-Participating Members:
    1. ...

2. …

- The final homework grade will be subject to peer evaluations at the end of the semester.
  - For example, if your team's average score on all assignments is 95, and you receive an average peer evaluation of 96%, your overall score for the homework assignments will be 95 × 96% = 91.2%.
  - Refer to the last page of this syllabus for a sample completed peer evaluation. The same form will be posted in Excel format on eLearning for you to download, complete, and submit.
  - If you miss the submission deadline, the self-evaluation score will be considered as 0 (in the last column).
  - You must include the members' names in the table. Failure to do so will result in a "no submission" status, as the given scores cannot be attributed to specific individuals.

Exams

- There will be three noncumulative exams.
- Exams will be administered online via eLearning at the testing center.
  - **Registration deadline:** Reserve a time slot at least 48 hours before your exam appointment at UT Dallas Testing Center.
  - **Check-in Time:** If your exam duration is, for example, 2 hours, you must arrive at least 2 hours before the Testing Center's closing time. Arriving later than this will prevent you from taking the test. If you receive extra time accommodations from the AccessAbility Resource Center, account for this additional time in your arrival plan.
- You can begin booking a seat at the testing centers as soon as the semester starts. Please do so as soon as possible.
- No makeup exams will be offered if you miss the booking deadlines, regardless of the reason.
- You may access all class materials posted on eLearning during the exam, but hard copies of notes are not allowed.
- You may use RStudio during the exams.
- Online searches and any form of communication are prohibited during the exam.
- Traumatic events are unfortunate, and I understand how difficult these times can be. If you experience a traumatic event, I will gladly provide a makeup exam if you contact me within 24 hours.
- Grading claims must be made within one week of the return of the exam or assignment. Periods when the university is not in session will not count towards this week.

Extra Credits:

- Yes. The instructor may assign one or two questions at the end of each class, which should be submitted on the learning platform. Points earned from these questions will be considered as extra credit and will be applied to your final weighted grade. The instructor will determine the percentage of extra credit allocated to your final grade at the end of the semester.

Classroom Citizenship:

Please ensure you manage your time to arrive promptly and stay until the end of each class. Maintain a respectful learning environment by refraining from talking and silencing your cell phones. Avoid inappropriate and disruptive behavior. For more information, refer to Section 49.07: Faculty Role in Removal for Misconduct at UT Dallas Policy.

University Policies

For information on a host of UTD course policies, see http://go.utdallas.edu/syllabus-policies. Several, but not all, of these policies are addressed in more detail below.

Nondiscrimination

UTD's Nondiscrimination Policy states, "The University of Texas at Dallas is committed to providing an educational, living and working environment that is welcoming, respectful and inclusive of all members of the university community. An environment that is free of discrimination and harassment allows members of the university community to excel in their academic and professional careers. To that end, to the extent provided by applicable federal and state law, the University prohibits unlawful discrimination against a person because of their race, color, religion, sex (including pregnancy), national origin, age, disability, genetic information, or veteran status. The University's commitment to equal opportunity extends its nondiscrimination protections to include sexual orientation, gender expression and gender identity.

"Retaliation against a person who files a claim of discrimination, participates in a discrimination investigation or proceeding, or otherwise opposes an unlawful employment practice is prohibited.

"A person who believes that he or she has been subjected to discrimination or harassment in violation of this policy and seeks to take action may use either the informal resolution process or the formal complaint process, or both. The informal resolution and formal complaint process described in this policy are not mutually exclusive and neither is required as a pre-condition for choosing the other; however, they cannot both be used at the same time."

For the full policy statement, see https://policy.utdallas.edu/utdbp3090.

AccessAbility Services

It is the policy and practice of The University of Texas at Dallas to make reasonable disability-related accommodations and/or services for students with documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required (see http://www.utdallas.edu/studentaccess). If you are eligible to receive disability-related accommodations and/or services and to ensure accommodations will be in place when the academic semester begins, students are encouraged to submit documentation four to six weeks in advance. Students who have questions about receiving accommodations, or those who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact the Office of Student AccessAbility for a confidential discussion.

The Office of Student AccessAbility provides:

a) Academic accommodations for eligible students with a documented permanent physical, mental or sensory disability
b) Facilitation of non-academic and environmental accommodations and services
c) Resources and referral information, and advocacy support as necessary and appropriate.

OSA is located in the Student Services Building, suite 3.200. They can be reached by phone at 972-883-2098, or by email at studentaccess@utdallas.edu.

Academic Integrity

Students are expected to adhere to UTD's Student Code of Conduct:

Because the value of an academic degree depends on the absolute integrity and character of the student the university expects all students to maintain a high level of responsibility with respect to their behavior. As a member of the university community, it is imperative that a student maintain a high standard of individual responsibility and civility.

The dean may initiate disciplinary proceedings under Subchapter D against a student accused of a violation of the Code of Conduct upon complaint by a faculty member, a student or other source.

Academic dishonesty could result in disciplinary action from the university. Penalties could include receiving a grade of "F" for this course, expulsion, or even the revocation of a degree. With respect to academic dishonesty, see Section 49.10 from the Student Code of Conduct (http://policy.utdallas.edu/utdsp5003), which includes:

a) **Plagiarism:** The adoption or reproduction of ideas, words, statements, images or works of another person as one's own without proper acknowledgement.
b) **Cheating:** Using or attempting to use unauthorized materials, information, or study aids in any academic exercise. Academic exercise includes all forms of work submitted for credit or hours.
c) **Fabrication:** Falsification or creation of any information, data or citation in an academic exercise.
d) **Collaboration and/or Collusion:** Seeking or providing aid to another student in completion of any assignment submitted for academic credit without permission from the faculty member.

Student Standards of Conduct

https://policy.utdallas.edu/utdsp5003

Cheating: Includes but is not limited to the use, attempted use, or providing of unauthorized materials, information, or study aids in any academic exercise; the use of sources beyond those authorized by the instructor in completing any academic exercise. Any type of discussion about questions and answers on assignments/tests, including those held in social media platforms and other electronic chat groups, may be considered cheating. Failure to submit a test within the timeframe allocated by the professor, whether in the classroom or in the University testing center, may be considered cheating. Academic exercise includes all forms of work submitted for credit or hours.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.
Please go to Academic Support Resources webpage for these policies.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.
Please go to UT Dallas Syllabus Policies webpage for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.

Appendix: Peer Evaluation Form for Group Homework

BUAN/OPRE 6359 – Advanced Statistics for Data Science

Instructions: The information submitted is final and cannot be changed. So please rate each of your fellow team members with respect to the criteria listed in the table below. Be honest, reasonable, and fair.

Group number: _____

	Amy Becker	Chris Drake	Eileen Flay	Gene Hanks	Yourself
Meeting attendance (15%)	13%	15%	15%	14%	15%
Punctuality of work (15%)	13%	15%	14%	15%	13%
Fair share of work (30%)	28%	30%	26%	27%	29%
Quality of work (40%)	34%	40%	40%	35%	36%
Total (100%)	88%	100%	95%	91%	93%

Name: _____ Date: _____

Comments: