The University of Texas at Dallas
School of Management
Course Syllabus
Spring 2024

Course Information

Course Number: OPRE 4V91.002
Course Title: Data Science for Business Application
Meeting: Thursdays, 2:30 pm-5:15 pm, JSOM 2.902

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: Wednesdays 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: Piyush Yerpude
Email: piyush.yerpude@utdallas.edu
Please write the course and the section number in the subject line.
Student Hours: Tuesdays 5:00 pm - 7:00 pm (online via MS Teams)
The meeting link is posted on the course homepage in eLearning.

Course Description

This course builds on the foundations of probability and statistics from OPRE 3360. It further develops knowledge and skills for applying statistical tools and management science models to business decision-making. Topics include hypothesis testing, analysis of variance (ANOVA), linear regression, data transformation, model selection procedures, Chi-square tests, logistic regression, and nonparametric methods. The course also uses the statistical package R to emphasize interpretation, inference, and computation.

Student Learning Objectives/Outcomes

I will do my best to use approaches that encourage active participation and hope you take advantage of them because I have found they are the best way to engage you in learning. Class sessions will consist primarily of lectures, with some discussions and in-class exercises appropriate 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.
Upon completion of this course, students will be able to:

1. Develop and conduct one-sample and two-sample hypothesis tests for population parameters using t-tools.
2. Perform Analysis of Variance (ANOVA) to test the equality of several sample means.
3. Apply regression analysis to establish a relationship between a response variable and one or more explanatory variables.
4. Test whether two categorical variables are independent using the Chi-square test.
5. Measure the probability of a discrete outcome given the value of an input variable using a logistic regression model.
6. Communicate the findings of statistical analysis from these new methods in a clear, concise, and scientific manner.
7. Integrate and analyze real-world datasets using the statistical package R.

Pre-requisites

- OPRE 3360 (Managerial Methods in Decision Making Under Uncertainty)

Course Materials

- **Recommended Textbook:** Doane and Seward (2021). *Applied Statistics in Business and Economics (7th ed.)*. McGraw Hill. Ch 9 – 16 (excluding Ch 14).
- **Required Software:** R & R-Studio
  The installation instructions are posted on the course homepage in eLearning.

Communication

- **eLearning:** I post the class materials on the course page in eLearning. Please read the emails I send via eLearning and the *announcements* I post on eLearning.
- **Meetings:** We can meet regularly during student hours (mentioned above) to discuss your questions.

Topics and Tentative Academic and Assignments Calendar

***Note**: Lectures may overlap from one class to the next.*

Week No.	Week of	Topics	HW	Due Date
Module 1				
Week 1	Jan 15	Syllabus review/ quiz Installing and Introduction to R & R-Studio Overview of Hypothesis Testing and Confidence Interval		
Week 2	Jan 22	One-sample t-test Interval Estimate for Population Mean	HW 1	Feb 4
Week 3	Jan 29	Two-sample t-test Interval Estimate for the Difference between Two Populations Mean		
Week 4	Feb 5	Paired t-test Analysis of Variance (ANOVA)	HW 2	Feb 18

Week 5	Feb 12	ANOVA (con't) Review for Exam 1		
Week 6	Feb 19	**Exam 1--To be taken between Feb 21 and Feb 23 in the Testing Center (9am - 9pm).**		
Module 2				
Week 7	Feb 26	Simple Linear Regression and Data Transformation	HW 3	Mar 17
Week 8	Mar 4	Multiple Linear Regression	HW 4	Mar 24
Week 9	Mar 11	No Class -- Spring Break		
Week 10	Mar 18	Inferential Tools for Multiple Regression		
Week 11	Mar 25	Model and Variable Selection Procedures Review for Exam 2		
Week 12	Apr 1	**Exam 2 -- To be taken between Apr 3 and Apr 5 in the Testing Center (9am - 9pm).**		
Module 3				
Week 13	Apr 8	Logistic Regression	HW 5	Apr 28
Week 14	Apr 15	Chi-Square Tests		
Week 15	Apr 22	Nonparametric Test Review for Exam 3 (if there is enough time)	--	--
Week 16	Apr 29	**Exam 3 -- To be taken between May 1 and May 3 in the Testing Center (9am - 9pm).**		
		Peer evaluation, submitted online via eLearning by Sunday, May 5th at 11:59 pm.		

- Note: The assignments are due at midnight on the specified date. The due dates are designed to make sure that you will be able to master each of the course objectives by the end of the semester. I encourage you to plan to complete all assignments by the due date. If you miss the deadline, you could submit by no later than 12 hours after the due date for partial credits. Assignment solutions will be posted the day after the deadline.

Grading Policy

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

Grading Scale

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

Course Policies

Homework Assignments

- Five equal-weight homework assignments will be given.
- Students should work in groups of **five** on homework assignments.
- Students should sign up for a group on the course home page on eLearning.
- Each team must have a team leader responsible for submitting (1) homework solutions (in a PDF format) and (2) R scripts (if any) on e-learning.
- Homework solutions must be typed. Handwritten submissions won't be graded.
- The final homework grade is 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 evaluation of 96% from your teammates and yourself. Then, your overall score for the homework assignments will be $95 \times 96\% = 91.2\%$.
  - Please refer to the last page for a sample completed peer evaluation. The same form in Excel will be posted on eLearning, where you download, fill out, and submit it.
  - If you miss the submission deadline, the evaluation that you would give yourself is considered 0 (the last column).

Exams

- Three noncumulative exams will be given.
- The exams will be proctored at the UTD Testing Center on the scheduled date and time as in the Academic Calendar table above. You must complete the exam during the scheduled time window. Please review the Testing Center Student Guidelines.
- Please reserve a time slot no later than **48 hours** before the exam appointment time on the Exam Registration page.
- You can start booking a seat for right after the semester starts. Please do so ASAP.
- No makeup exam (in any form) is offered if you miss the booking deadlines (for any reason).
- You can use one double-sided A4 cheat sheet during the exams. The cheat sheet must be handwritten.
- You are allowed to use R-Studio during the exams.
- No online search and communication in any form during the exams is allowed.
- Traumatic events are unwelcome, and I understand how difficult these times are. Thus, I will give you a makeup exam if you contact me within 24 hours of the event.

Final Note: *Claims against grading can only be made for* ***one week*** *after the exam or assignment return. Periods when the university is not holding classes will not count towards this week.*

Class Attendance

Our class sessions are key for learning together. Therefore, please plan to attend all classes. Although participation is not graded, I take attendance. Note that virtual attendance is not possible because this is an in-person class.

Classroom Citizenship:

Please manage your time so that you arrive on time and leave at the end. No talking, please. No cell phones in class, please. Inappropriate and disruptive behavior should be avoided. See Section 49.07: Faculty Role in Removal for Misconduct at https://policy.utdallas.edu/utdsp5003

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 acknowledgment.
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.

Section C. 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

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: _____ Signature: _____

Date: _____

Comments: