

OPRE / BUAN 6359 – Advanced Statistics for Data Science

Professor Contact Information

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Textbook

Ramsey, F. L., and Schafer, D. W. (2013), *The Statistical Sleuth: A Course in Methods of Data Analysis* (3rd ed.), Boston, MA: Brooks/Cole. Textbooks and some other bookstore materials can be ordered online or purchased at the UT Dallas Bookstore.

Computer / Software Requirement

You do need a Windows or Mac computer. We'll also use R since the class is R-based. In addition, MS Excel will be used. MS Teams will be used for online office hours and class tutorials, if any.

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 central location, standard deviations, histograms, the normal and t-distributions (knowledge of calculus is not required). The course also emphasizes interpretation and inference, as well as computation using a statistical software package such R, and also MS Excel.

Learning outcomes and expectations: Active and informed participation is expected from every student. Class sessions will consist primarily of lecture, with some discussions and in-class exercises as appropriate to the topic being covered. Students are expected to read the appropriate assigned readings in preparation for class and exams. Students should expect to spend an average of 9 to 12 hours per week on class preparation and studying activities outside of class meetings.

This course involves some computations because there is no substitute for getting your hands dirty. I expect to make my share of mistakes this semester (some intentional, some not), and we will learn from them together. In data analysis, you learn as much when things “don’t work” than when they go as planned.

We will use R and Excel as tools to achieve our objective of solving statistical problems.

However, this is not a programming course. Even though we will have some class discussions on these, but it's your responsibility that you learn R and some Excel.

Upon completion of this course, students will be able to accomplish the following:

1. Develop and test hypotheses using multiple statistical methods.
2. Understand differences between observational and experimental studies.
3. Learn how randomization and sampling influence 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 a statistical analysis from these new methods in a clear, concise, and scientific manner.
6. Integrate and analyze real-world datasets using common software packages.

Grading Policy

The grading will be based on the class ranking. Here is the tentative table. **You must maintain a minimum 65% average to pass the class regardless of your ranking.**

Rank between	Grade	How many?
100.00%	A	35%
65.00%		
64.99%	A-	5%
60.00%		
59.99%	B+	25%
35.00%		
34.99%	B	20%
15.00%		
14.99%	B-	10%
5.00%		
4.99%	Will be decided	5%
0.00%		

Assessment	Tests	Quizzes & Homework	Total
Weight	75%	25%	100%

Academic Calendar

The following table provides the weekly class schedule. Please keep up with this on a regular basis, or you'll fall behind.

OPRE / BUAN 6359 Fall 2024

Class	Week of	Topic / Lectures	Reading	Notes
1	Tue-20-Aug	Introduction, R, Descriptive Statistics	Notes provided	
2	Tue-27-Aug	Probability	Notes provided	
3	Tue-03-Sep	Distributions; Normal to Binomial	Notes provided	
4	Tue-10-Sep	Sampling / Confidence Interval	Notes provided	
5	Tue-17-Sep	Hypothesis Testing	Notes provided	
6	Tue-24-Sep	Hypothesis Testing; Test 1 Review	Notes provided	Test 1 Sept 26-28
7	Tue-01-Oct	t-tests; Alt to t-tests	Notes provided; Ch 4	
8	Tue-08-Oct	Drawing Statistical Conclusions; Data Screening and Log Transformation	Ch 1, Ch 2, Ch 3	Shapes, Robustness, Log Transformation
9	Tue-15-Oct	Multiple Comparison of Means	Chapter 5, 6.4	5.1, 5.2, 5.4,5.5
10	Tue-22-Oct	ANOVA 2-factor; Test 2 Review	Chapter 13	Test 2 Oct 24-26
11	Tue-29-Oct	Regression Assumptions; R-Square	Ch 8, Ch 9.2, 9.3	
12	Tue-05-Nov	Multiple Regression, Model Checking / Refinement, Logistic Regression	Ch 10, 11.2, 11.4, Ch 20	
13	Tue-12-Nov	Multiple Regression, Model Checking / Refinement, Logistic Regression	Ch 10, 11.2, 11.4, Ch 20	Makeup test Nov 16
14	Tue-19-Nov	Chi-Sq Tests	Chapter 19	
15	Tue-26-Nov	Thanksgiving break		
16	Tue-03-Dec	Strategies of Variable Selection Test 3 Review	Chapter 12	12.1 - 12.4, 12.6
17	Dec 4 - 7	Test 3		Test 3 Dec 4-7

Quiz / HW / Test (Quiz and HW are due at 6:00:00 AM)

Item	Available	Finish by	Topics	Weight	Notes
Quiz 1	Fri-23-Aug	Mon-09-Sep	Descriptive Statistics	2%	Unlimited attempts
Quiz 2	Fri-23-Aug	Mon-02-Sep	Probability Concepts	2%	Five attempts
Quiz 3	Fri-30-Aug	Mon-09-Sep	Probability Distributions	2%	Five attempts
HW 1	Fri-30-Aug	Mon-23-Sep	Intro to R; Descriptive, Distributions	3%	R-based; Submit online
Quiz 4	Fri-06-Sep	Mon-16-Sep	Sampling, Estimation	2%	Five attempts
Test 1	Thu-26-Sep	Sat-28-Sep	Quiz 1 - 4 topics; Testing center	25%	Testing center; No R
Quiz 5	Fri-27-Sep	Mon-14-Oct	Hypothesis, t-tests	2%	Five attempts
HW 2	Fri-27-Sep	Mon-14-Oct	t-tests, Alt-t tests / R-Markdown	4%	R-based; Submit online
Quiz 6	Fri-04-Oct	Mon-21-Oct	ANOVA-1 way, Alt-t, Transformation	2%	Five attempts
Test 2	Thu-24-Oct	Sat-26-Oct	Quiz 4 - 6 Topics; Testing center	25%	Testing center; No R
HW 3	Fri-15-Nov	Mon-02-Dec	ANOVA, Regression, Logistics Regression	5%	R-based; Submit online
Quiz 7	Fri-22-Nov	Mon-02-Dec	Chi-Sq Tests	1%	Five attempts
Test M	Sat-16-Nov	Sat-16-Nov	Makeup Test (for those who missed Test 1 or Test 2)	25%	Testing center; No R
Test 3	Wed-04	Sat-07-Dec	Regression, Logistics, ANOVA, ChiSq, t-tests; Hypothesis testing	25%	Testing center; No R

Test, Quiz, and Homework

Test: Tests, 150-minute duration, will be online and can only be taken at the testing center. You must reserve your spots or they will be gone (and you'll have a 0 on that test). Please review the **very important Testing** center policies on the class's homepage.

You are allowed a 1-page double-sided cheat card for each test. Excel will be available. You can take a calculator of your choice; scratch paper will be provided. The probability tables will also be provided.

Quizzes: The due time is 6:00:00 AM. You'll have multiple attempts, but the questions may change. So, even if you get 100% the 1st time, you can (should) take them again. Your final score will be the max of all the attempts. You are encouraged to work with your classmates.

A quiz, late by just 1 second, will be considered late, and your score will be 0. This is an eLearning issue that can't be fixed.

After you submit a quiz, you can check your rights and wrongs by right-clicking on the score in the gradebook. After the due date, you can see all the correct answers.

Homework: The HW assignments will be R-based. You'll download the HW file, work on it, and upload (only) your R code back onto eLearning. **You must work individually on the HW assignments.**

HW will also be due at 6:00:00 AM and must be uploaded (no emails).

Make-up Test: If you are unable to take Test 1 or Test 2 for whatever reason, you can take the makeup test. It will include selected topics from Test 1 and Test 2.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student Accessibility has approved the student to record the instruction, **students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments** except to implement an approved Office of Student Accessibility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings,

consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, A to Z Guide, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3, and in Title V, Rules on Student Services and Activities of the university's Handbook of Operating Procedures. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Distance Learning Student Resources

Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the [eLearning Current Students](#) webpage for more information.

Course Access and Navigation

This course can be accessed using your UT Dallas NetID account on the eLearning website.

Please see the course access and navigation section of the Getting Started with eLearning webpage for more information.

To become familiar with the eLearning tool, please see the Student eLearning Tutorials webpage.

UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The eLearning Support Center includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

Communication

This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and **Microsoft Teams** will also be used during the semester.

Please review the important technical requirements on the [Getting Started with eLearning](#) webpage. More info is available here: [Student eLearning Tutorials](#). Also, please get familiar with Microsoft Teams.

Student emails messages will be answered within 3 working days under normal circumstances. *Please make sure you put **6359** in your emails* for an easy identification.

Server Unavailability or Other Technical Difficulties

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online [eLearning Help Desk](#). The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

COVID-19 Guidelines and Resources

The information contained in the following link lists the University's COVID-19 resources for students and instructors of record. Please see <http://go.utdallas.edu/syllabus-policies>.

Classroom Conduct Requirements Related to Public Health Measures

UT Dallas will follow the public health and safety guidelines put forth by the Centers for Disease Control and Prevention (CDC), the Texas Department of State Health Services (DSHS), and local public health agencies that are in effect at that time during the Fall 2021 semester. Public health measures may be required for class participation (e.g., wearing of masks, social distancing) and students who refuse to comply may face disciplinary action for [Student Code of Conduct](#) violations. Students who are unable to comply with the university policies including wearing a face covering should consult the [Student Safety](#) webpage for further instructions.

Students who have tested positive for COVID-19 or may have been exposed should not attend class in person and should instead follow required disclosure notifications as posted on the university's website (see "[What should I do if I become sick?](#)" webpage)

Special Assistance

For help with test anxiety or time management, the following resources are available: your academic advisor, the Learning Resource Center (MC2.402), the Counseling Center (SU1.608), the New Student Programs Office (SU1.610), your instructor.

Expectation

University guidelines recommend that you study 2-3 hours per week for every credit hour in which you are enrolled. That is, University expectations suggest you spend 4-9 hours outside of class every week on OPRE6301 homework and studying.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must

do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Friday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22

PO Box 830688

Richardson, Texas 75083-0688

(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

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 review the catalog sections regarding the [credit/no credit](#) or [pass/fail](#) grading option and withdrawal from class.

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.