**BUAN/OPRE 6359: Advanced Statistics for Data Science**
**University of Texas at Dallas**

**Course Syllabus**

**Disclaimer:**
The material contained in this syllabus is subject to change upon announcement by the instructor in class.

**Course Information:**

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| Course Number: | BUAN/OPRE 6359 |
| Course Title: | Advanced Statistics for Data Science |
| Term: | Fall 2022 |
| Lecture Time: | Thursday, 4:00pm - 6:45pm |
| Lecture Location: | JSOM 1.212 |
| Instructional Mode: | Face to Face |
| Course Platform: | Class will be delivered face-to-face in the classroom. |


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| **Instructor:** | Negin Enayaty Ahangar, Ph.D. |
| Office Information: | JSOM 14.409 |
| Office Hours: | Monday/Wednesday, 1:00pm - 2:00pm |
| Email: | Negin@UTDallas.edu |
| **Teaching Assistant**: | Manvi Nishith Mehta |
| Online Office Hours: | Tuesday/Thursday, 10:00am - 12:00pm |
| Email: | Manvi.Mehta@UTDallas.edu |


**Course Pre-requisites, Co-requisites and/or Other Restrictions:**
Credit cannot be received for both: OPRE 6301 and OPRE 6359/BUAN 6359.

**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 as R or STATA.

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

- Develop and test hypotheses using multiple statistical methods.
- Understand differences between observational and experimental studies.
- Learn how randomization and sampling influence the scope of inference.
- Explore experimental and observational designs that compare multiple populations when the response is continuous or binary.
- Communicate the findings of statistical analysis from these new methods in a clear, concise, and scientific manner.
- Integrate and analyze real-world data sets using common software packages.

**Course Materials:**
Required textbook:

1. The Statistical Sleuth: A Course in Methods of Data Analysis - $3^{rd}$ edition
    - Author: Fred Ramsey and Daniel Schafer
    - Ebook ISBN: 9781285287706 (Cengage Unlimited eTextbooks: ISBN 9780357693339)
    - Book files: `www.statisticalsleuth.com`

Recommended textbooks:

1. Statistics for Management and Economics - $11^{th}$ edition
    - Author: Gerald Keller
    - Ebook ISBN: 9780357685778 (Cengage Unlimited eTextbooks: ISBN 9780357693339)
2. The Book of R: A First Course in Programming and Statistics - $1^{st}$ edition
    - Author: Tilman M. Davies
    - Ebook ISBN: 9781593277796

Required software: R & R-Studio, Microsoft Excel

**Grading Criteria:**
Grades are assigned based on the following weighting. The grading scheme will depend on the performance of students in the class.

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| Assignments | 25% |
| Exams (sorted in ascending order) | 20% (lowest grade), 25%, 30% (highest grade) |

**Course Policy:**

1. **General:**
    - Sessions will not be recorded.
    - It is your responsibility to read the syllabus and check the eLearning for announcements/changes daily.
    - You must pay close attention to all the due dates from the first day of class and schedule your activities around those dates.
    - For any grade posted on eLearning, you have one week after it is posted to email the instructor a regrading request.
2. **Exams:**
    - Exams will be administered by the Testing Center. Students should visit `https://ets.utdallas.edu/testing-center` to register for a seat and for more information.
    - Students should register for a seat no later than one week prior to the beginning of the exam period. Failure to do so will result in a 10-point penalty on the exam grade.
    - Exams will NOT be available to students after submission. However, you have one week, after grades are posted on eLearning, to check your graded test during the instructor's office hours and have the instructor's feedback.
    - There will be NO make-up for any missed exam except for medical emergencies in which a written statement is required for justifying the situation along with the physician's address and phone number.

3. **Assignments:**
    - The assignments will be assessed through eLearning.
    - There will be NO make-up for any missed assignment.
4. **Extra Credit:**
    - Extra credit will NOT be offered.
5. **Academic Dishonesty/Cheating:**
    - Students are required to read, understand and abide by the university policy on academic honesty.
    - Any student who is found responsible for committing an act of academic dishonesty will receive a grade of "F" or "0" (zero) on that quiz, exam, assignment, project or course.
    - The instructor reserves the right to change the grading policy without any notice due to unforeseen circumstances such as dishonesty, cheating, etc.
6. **Mobile Phones, Laptops & Electronic Devices:**
    - Taking unauthorized pictures or recording during the lecture/classroom from presented materials with a mobile phone, laptop, camera or any other device is an infringement of privacy rights and is prohibited.
7. **Class Materials:** Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

**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.***

**UT Dallas Syllabus Policies and Procedures:**
The information contained in the following link constitutes the University's policies and procedures segment of course syllabus. Please see `https://go.utdallas.edu/syllabus-policies`.

**COVID-19 Guidelines and Resources:**
The information contained in the following link lists the University's COVID-19 guidelines and resources for students. Please see `https://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 to the extent allowed by state governance. Texas Governor Greg Abbott's Executive Order GA-38 prohibits us from mandating vaccines and face coverings for UT Dallas employees, students, and members of the public on campus. However, we strongly encourage all Comets to get vaccinated and wear face coverings as recommended by the CDC. Check the Comets United: Latest Updates webpage for the latest guidance on the University's public health measures. Comets are expected to carry out Student Safety protocols in adherence to the Comet Commitment. Unvaccinated Comets will be expected to complete the Required Daily Health Screening. Those students who do not comply will be referred to the Office of Community Standards and Conduct for disciplinary action under the Student Code of Conduct - UTSP5003.

The following is a tentative schedule, which will be followed as closely as possible. However, should any changes become necessary, it will be announced via eLearning. It is your responsibility to keep track of announcements regarding changes to this schedule.

**Course Calendar:**

| Week | Date | Topic | Lecture | Assignment |
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| 1 | Thursday, August 25 | Descriptive Statistics | Lecture 1 | |
| 2 | Thursday, September 1 | Probability | Lecture 2 | |
| 3 | Thursday, September 8 | Probability Distributions | Lecture 3 | |
| 4 | Thursday, September 15 | Sampling Distributions and Confidence Intervals | Lecture 4 | |
| 5 | Thursday, September 22 | Hypothesis Testing | Lecture 5 | |
| 6 | Thursday, September 29 | Hypothesis Testing | Lecture 5 | Assignment 1 |
| | | Drawing Statistical Conclusions | Lecture 6 | (Lectures 1-5) |
| 7 | Thursday, October 6 | **Exam 1 (October 6 - October 8)** | **Lectures 1-5** | |
| 8 | Thursday, October 13 | Inference Using t-distributions | Lecture 6 | |
| | | A Closer Look at Assumptions | Lecture 6 | |
| 9 | Thursday, October 20 | Comparisons Among Several Samples | Lecture 7 | Assignment 2 |
| | | Linear Combinations and Multiple Comparisons of Means | Lecture 7 | (Lectures 6-7) |
| 10 | Thursday, October 27 | Simple Linear Regression | Lecture 8 | |
| 11 | Thursday, November 3 | **Exam 2 (November 3 - November 5)** | **Lectures 6-7** | |
| 12 | Thursday, November 10 | A Closer Look at Assumptions for Simple Linear Regression | Lecture 8 | |
| 13 | Thursday, November 17 | Multiple Regression | Lecture 9 | |
| | | Inferential Tools for Multiple Regression | Lecture 9 | |
| 14 | Thursday, November 24 | **Thanksgiving Holiday** | | Assignment 3 |
| 15 | Thursday, December 1 | The Analysis of Variance for Two-Way Classifications | Lecture 10 | (Lectures 8-10) |
| 16 | Thursday, December 8 | **Exam 3 (December 3 - December 8)** | **Lectures 8-10** | |