	Course	**OPRE 3360.007: Managerial Methods in Decision Making Under Uncertainty**
	Professor	Prof. Anyan Qi
	Term	Spring 2024
	Meetings	Tuesday 4:00pm-6:45pm, JSOM 2.115

PROFESSOR'S CONTACT INFORMATION

Office Phone	(972)883-5952
Office Location	JSOM 3.214
Email Address	Use **the email tool** on eLearning to contact me (note the email below is the TA's email.)
Office Hours	Monday 3pm-4pm[1], or by appointment
TA	Mehdi Taher
TA Email	Mehdi.Taher@UTDallas.edu
TA Office Hours	Monday 4:00pm-6:00pm and group assignment due date 4:00pm-6:00pm in JSOM 14.211. The Statistics and Math lab also offers assistance to undergraduate students for OPRE 3333 and OPRE 3360. The schedule is to be announced on eLearning and it is located in room 2.414.

GENERAL COURSE INFORMATION

Pre-Requisites	MATH 1325 or MATH 2413 or MATH 2417
Other Restrictions	OPRE 3360 and STAT 3360 cannot both be used to fulfill degree requirements.
Course Description	Introduces the concepts of probability and statistics to managerial decision making. Concepts will be developed in lecture and exercises using software packages. Topics include: summarizing and presenting data, probability theory, sampling, estimation, confidence intervals, hypothesis testing, regression, and ANOVA. Emphasis will be given to modeling and solving business problems in finance, marketing, accounting, and operations Management.
Learning Outcomes	On successful completion of this course a student will be able to use the tools of probability and statistical modeling to support business decisions. Specifically, she/he (i) can quantify uncertainty found in business situations and form probabilistic knowledge, (ii) estimate the key metrics based on data and test hypotheses about business realities using data, and (iii) build a statistical model of uncertain business realities for insight gathering and prediction.
Required Texts & Materials	**No textbooks required.**

[1] All the time in the syllabus refers to the time in the North America Central Time Zone (CT).

Other Texts, Readings & Materials

If students would like to read a textbook, the followings are recommended:

- (optional) Anderson, D., Sweeney, D., Williams, T., Camm, J., Cohran, J., Fry, M., and Ohlmann, J. Modern Business Statistics with Microsoft Office Excel, 7th ed.

The lecture notes and other materials posted on eLearning should be sufficient for the students to learn the material. The optional textbooks are not required.

COURSE POLICIES

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. 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.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Specifically,

- You are expected to actively participate in the class. See "Strategies for Success" below on "Participation" for more details.
- You are expected to read the required materials prior to the corresponding class lecture (see the Course Outline for detail).
- You are responsible for all material discussed and all course schedule changes announced during class.

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 AccessAbility 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 AccessAbility 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.

Grading (credit) Criteria

The total score (100 points) will be made up of five parts.

- **Assignments (25%).**
  - **Individual assignments (10%).**

    Most individual assignments are due the night before each lecture and should be completed on eLearning.
  - **Group assignments (15%).**

    The students are expected to form groups of 4-5 students and complete three group assignments during the semester. At the end of the semester a peer-review form will be used to evaluate team members' performance; each member's grade may be adjusted up or down based on feedback from other team members.
- **Quiz and Tests (65%).**
  - **Test I (25%).**

    This test covers the first course module. The Test is open-eLearning and two double-sided letter-size cheating sheets allowed. Students are permitted to use Excel in the test. The test location is the Testing Center at the First floor of the Synergy Park North 2 building (SP2).[2] Any communications among students during tests are not allowed.
  - **Test II (40%).**

    This test covers the second and third course module. The Test is open-eLearning and two double-sided letter-size cheating sheets allowed. Students are permitted to use Excel in the test. The test location is the Testing Center at the First floor of the Synergy Park North 2 building (SP2). Any communications among students during tests are not allowed.
- **Class participation (10%).**

  Class attendance is highly encouraged. If you must miss a class because of an emergency you will have to contact the professor in advance for permission and provide proof, and you may need to meet with the professor individually to make up the class. You are also expected to actively participate in class.

[2] **Testing Center Address**:
3020 Synergy Park North, SP2, Suite 11.175
Richardson, TX 75080

Letter grade

You will be evaluated relative to the class.

Make-Up Exams

NO make-up exam will be offered except in case of medical emergency (proof required).

Extra Credit

Extra credit will **NOT** be offered.

Late Work

NO late assignments will be accepted.

Classroom Citizenship

- Class begins on time. Please maintain class decorum and be respectful toward fellow students in the class. If you have a doubt or misunderstanding regarding course work feel free to discuss it with me.
- Using your phone during class is not permitted and is rude. Keep your phone on silent at all times and away from your desk. This includes no texting. Offenders will be asked to turn off their phones. If this is a recurring problem students will be asked to give their phones to the instructor and will be returned at the end of the class session.
- Laptop computer policy: students are encouraged to bring a laptop to class, particularly in Module III since we will practice using Excel's statistical and regression features. Using a laptop (for the purpose of obtaining the numbers and taking notes) is permitted. All other features and their usage (such as e-mail, internet, games, and instant messenger) are **strictly prohibited** and regarded as class disruptions.
- These rules will be enforced.

Software

The course will involve extensive use of Microsoft Excel, and in particular the data-analysis tool pack (a native Excel add-in). The use of each tool will be discussed in class but basic familiarity (such as copy and paste, entering formulae) with Microsoft Excel is assumed. I expect that students will use Excel 2013 or newer version.

Please use the link to download and install the newest Excel for free as a UTD student: https://www.utdallas.edu/oit/o365/.

Mac Support

Microsoft Office 2016 for Mac (or newer version) features regression tools (which we will be using in Module III). I recommend that students with Mac install the newset version or use Microsoft Office for Windows.

Please use the link to download and install the newest Excel for free as a UTD student: https://www.utdallas.edu/oit/o365/.

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.

Please go to http://go.utdallas.edu/academic-support-resources.

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 sections regarding the credit/no credit grading option and withdrawal from class.

	Please go to http://go.utdallas.edu/syllabus-policies for these policies.
Academic Support Resources	*The information contained in the following link lists the University's academic support resources for all students.* *Please go to http://go.utdallas.edu/academic-support-resources.*

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

STRATEGIES FOR SUCCESS

1. **Class preparation:**

   The main topics, reading assignments, and suggested problems appear below. In each class you will be expected to:

   a) Complete required readings and skim lecture notes (prior to class) if you have time.
   b) Take notes on the printed lecture notes or the electronic files on your tablet/laptop.
   c) Do all required Excel pre-work assignments prior to class and bring a laptop for Module III.
   d) Solve the individual assignment problems in the Practice Problem Set **assigned for each class** listed in the syllabus (before and after class).
   e) (Optional) Read the appropriate portions of the textbook (before and after class).
   f) Bring a **nameplate** to every class.

   I understand that you have limited time. However, I strongly urge you to devote adequate time to the course since this is not material you can cram over a day or two. If you are pressed for time for specific classes, prioritize your class preparation in the order given above.

2 . **Class participation:**

   Please bring your **nameplate** to every class. The nature of the contributions students can make in class depends on whether we are covering basic tools, or asking for managerial conclusions. Excellent participation in this course means helping the entire class with salient questions, contributions, or clarifications. Less than excellent participation would include *disruptive entrances/departures, causing distraction to yourselves, colleagues, and instructors by inappropriate use of your laptop or cellphone, and/or taking class time to ask for information that would be redundant for students properly prepared for class.*

3. **Workload expectation:**

   The key to competence is **PRACTICE**. You will be given the opportunity to work on many practice problems in this course.

   Note that university guidelines recommend that you study 2-3 hours per week for every credit hour in which you are enrolled. University expectations suggest you spend **6-9 hours** outside of class every week on homework and studying for this course.

   A rule of thumb for time requirements is that I expect students will spend approximately 3 hours preparing for and reviewing each class, with additional time spent solving the practice problems and preparing for exams. Trimming this time input will diminish the value of the educational experience for everyone. Please recognize the importance of advance preparation, and begin now to level-load your course time input.

4. **How to get help:**

   In addition to my office hours, a TA will be available for additional office hours for those students who need help. Please contact the TA or me if you need to meet. This course is cumulative and moves rapidly. **DO NOT FALL BEHIND**! It is recommended that you see your instructor **immediately for any difficulties.**

5. **Tests:**

TEST I

A test will be given at the completion of the first course module. The test is open-eLearning, subject to the academic integrity policy. You will also be allowed to use Excel on the test. A practice test with solutions will be available on eLearning. The combination of reading, self-study exercises, classwork, practice, and graded individual and group assignments will fully prepare students to take the test.

TEST II

TEST II will be preceded by one review session. Absences from the test will be entertained only in cases of extreme emergency; academics are your number one priority right now. Sample tests will be posted on the eLearning site at least one week before the test date. The test is open-eLearning, subject to the academic integrity policy. You will also be allowed to use Excel on the test, so students will want to become used to Excel's various statistical functions and add-ins during class and on the homework.

ASSIGNMENTS AND EXAMS CALENDAR

ORPE 3360.007 Spring 2024 Course Outline

No.	Date	Class	Individual Assignments	Other Assignments
1	Jan 16	Class 1	HW 0 due at 11:45pm on Jan 22.	
2	Jan 23	Class 2	HW 1 due at 11:45pm on Jan 29.	
3	Jan 30	Class 3	HW 2 due at 11:45pm on Feb 5.	
4	Feb 6	Class 4	HW 3 due at 11:45pm on Feb 12.	
5	Feb 13	Class 5	HW 4 due at 11:45pm on Feb 19.	Group HW 1 due at 11:45pm on Feb 26.
6	Feb 20	Review Session for Test 1		
7	Feb 27	**TEST I: 2 hours** The test location is **Testing Center** at **Synergy Park North 2 building (SP2)**.[3]		
8	Mar 5	Class 6	HW 5 due at 11:45pm on Mar 18.	
	Mar 12	**NO CLASSES (Spring Break)**		
9	Mar 19	Class 7	HW 6 due at 11:45pm on Mar 25.	
10	Mar 26	Class 8	HW 7 due at 11:45pm on Apr 1.	Group HW 2 due at 11:45pm on Apr 1.
11	Apr 2	Class 9	HW 8 due at 11:45pm on Apr 8.	
12	Apr 9	Class 10	HW 9 due at 11:45pm on Apr 15.	
13	Apr 16	Class 11	HW 10 due at 11:45pm on Apr 22.	Group HW 3 due at 11:45pm on Apr 29.
14	Apr 23	Review Session for Test 2		
15	Apr 30	**TEST II: 2 hours** The test location is **Testing Center** at **Synergy Park North 2 building (SP2).**		

[3] **Testing Center Address**:
3020 Synergy Park North, SP2, Suite 11.175
Richardson, TX 75080

TENTATIVE COURSE OUTLINE

The following pages list a lecture-by-lecture outline of the entire course. The learning objective, readings, and required and suggested assignments for each lecture are listed. To help you maximize your learning from the lectures and prepare for the two tests, I have assigned a number of individual assignments and practice problems for each class.

I will attempt to stick to this schedule as much as possible, although I reserve the right to modify the lecture contents depending on the evolution of the course. Sufficient notice will be given for any changes.

To help you manage your time efficiently I have categorized the activities on the to-do list into mandatory (√) and optional (▪). I strongly encourage that you complete mandatory activities before or immediately after each class. The optional text reading is based on Anderson, D., Sweeney, D., Williams, T., Camm, J., Cohran, J., Fry, M., and Ohlmann, J. "Modern Business Statistics with Microsoft Office Excel," 7th ed.

ORPE 3360.007 Daily Course Schedules

Module I: Describing and Measuring Data and Uncertainty

Class 1 (January 16): Course overview and introduction to data description

Learning objectives for this unit:

- Understand the definition and classification of data
- Understand the scale of measurement
- Learn how to summarize data for a categorical variable using graphical methods
- Learn how to summarize data for a quantitative variable using graphical methods

Preparation:

- ✓ Required reading: **super important!** Carefully review the course syllabus and plan!
- ✓ Required reading: read class synopsis, cases, and lecture notes.
- ▪ Text reading: Chap 1: 1.1, 1.2, 1.4–1.9; Chap 2: 2.1, 2.2 (skip dot plot and stem-and-leaf display).
- ▪ Optional reading or skim: *For Today's Graduate, Just One Word: Statistics*, The New York Times
- ▪ Optional reading or skim: *Are you ready for the era of big data?*, McKinsey Global Institute
- ▪ Optional reading or skim: *The age of analytics: Competing in a data-driven world*, McKinsey Global Institute

After-class:

- ✓ Must-do: read the *Review of Quantitative and Excel Skills* (posted on eLearning).
- ✓ Must-do: sign up for your group on eLearning.
- ✓ Individual Assignment 0: (1) Sign for a group on eLearning; (2) Reserve your seat at Testing Center; (3) upload screenshots for your group and confirmation page at Testing Center website on eLearning before 11:45pm on Jan 22.

Class 2 (January 23): Introduction to probability

Learning objectives for this unit:

- Understand random events, probability spaces, and the basic laws of probability.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chap 2: 2.3; Chap 4: 4.1–4.4 (skip the combination and permutation on p.177–178).

After-class:

- ✓ Individual Assignment 1: Practice Problem Set 1: 1, 2, 3, 4, 5, 6 on eLearning before 11:45pm on Jan 29.

Class 3 (January 30): Working with random variables

Learning objectives for this unit:

- Understand the concept of a random variable and its probability distribution.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chapter 5: 5.1, 5.2 (skip discrete uniform distribution), 5.3, 5.4 (skip Covariance and Correlation for now and focus on cases where the random variables are independent. When random variables X and Y are independent, covariance $\sigma_{xy} = 0$ and correlation $\rho_{xy} = 0$. We will come back to discuss covariance and correlation in Module III)

After-class:

- ✓ Individual Assignment 2: Practice Problem Set 1: 9, 10, 11, 19–27 on eLearning before 11:45pm on Feb 5.

Class 4 (February 6): Discrete random variables and binomial distribution

Learning objectives for this unit:

- Learn how binomial distribution applies in business decision problems.
- Learn the difference between discrete and continuous random variables.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chapter 5: 5.5.

After-class:

- ✓ Individual Assignment 3: Practice Problem Set 1: 7, 8, 12–18 on eLearning before 11:45pm on Feb 12.
- ✓ Must-do: start to work on the 1st group assignment which is due in less than three weeks.

Class 5 (February 13): Continuous random variables and normal distribution.

Learning objectives for this unit:

- Learn how normal distribution applies in business decision problems.
- Preview the Central Limit Theorem.
- Learn types of data available and how to collect data.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chapter 6: 6.2.

After-class:

- ✓ Required assignment: work with your group to complete the 1st group assignment, and submit your group assignment (one copy per group) on eLearning before 11:45pm on Feb 26.
- ✓ Individual Assignment 4: Practice Problem Set 1: 28-34 on eLearning before 11:45pm on Feb 19.

Review Session for TEST I (February 20): A review session will be provided in class.

TEST I: The test will be held at Testing Center at Synergy Park North 2 building (SP2) on February 27. You have 2 hours to complete the exam. Note that the exam location is NOT the regular classroom.

TEST I covers the first course module. The test is open-eLearning and two double-sided letter-size cheating sheets are allowed. Students are permitted to use Excel in the exam, but any communications among students are strictly forbidden. For preparation, review all your individual assignments, review your group assignment, and solve practice questions for the test.

Module II: Statistical Inference and Hypothesis Testing

Class 6 (March 5): Sampling distributions and introduction to inference

Learning objectives for this unit:

- Explore why sampling leads to errors.
- Learn the concept of sampling error and its distribution.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chap 3: 3.1 (skip weighted mean and geometric mean), 3.2; Chap 7: 7.1–7.6.
- Optional reading or skim: article from The New York Times: *Risk Mismanagement: What led to the financial meltdown.*

After-class:

- ✓ Individual Assignment 5: Practice Problem Set 2: 1, 2, 3, 4, 5, 6, 7 on eLearning before 11:45pm on Mar 18.

No class on March 12 (Spring Break).

Class 7 (March 19): Confidence interval and hypothesis test

Learning objectives for this unit:

- Learn to construct a confidence interval for a population parameter (mean or proportion).
- Learn how to formulate null and alternative hypotheses.
- Understand the p-value for a hypothesis test and how to compute it.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chap 8: 8.1–8.4.

After-class:

- ✓ Individual Assignment 6: Practice Problem Set 2: 8, 9, 11, 12, 14 on eLearning before 11:45pm on Mar 25.
- ✓ Must-do: start to work on the 2nd group assignment which is due in two weeks.

Class 8 (March 26): Hypothesis test and introduction to statistical models

Learning objectives for this unit:

- Apply hypothesis test in business decision making.
- Understand the need and use of statistical models.
- Learn how to perform preliminary analysis.

Preparation:

- ✓ Required reading: read class synopsis, cases, and lecture notes.
- Text reading: Chap 9: 9.1–9.5.

After-class:

- ✓ Required assignment: complete the 2nd group assignment with your group members, and submit your group assignments on eLearning before 11:45pm on April 1.
- ✓ Individual Assignment 7: Practice Problem Set 2: 15, 16, 17, 18, 20, 25, 26, 27, 28, 29, 30 on eLearning before 11:45pm on Apr 1.

Module III: From Data to Insights: Statistical Modeling and Regression Analysis

Class 9 (April 2): Covariance, correlation, and simple linear regression

Learning objectives for this unit:

- Be able to establish the relationship between two variables.
- Learn the simple linear regression model.

Preparation:

- ✓ Required reading: read class synopsis and mini-cases.
- ✓ Must-do: download the data files to your laptop.
- Text reading: Chap 2: 2.4 (scatter diagram and trendline); Chap 3: 3.5; Chap 5: 5.4; Chap 14: 14.1–14.2, 14.7 (use Excel for regression).

After-class:

- ✓ Individual Assignment 8: Practice Problem Set 3: 1, 4, 5, 6, 7, 8, 16, 19, 20 on eLearning before 11:45pm on Apr 8.

Class 10 (April 9): Simple linear regression II

Learning objectives for this unit:

- Understand how regression can be used to estimate population parameters.
- Determine whether a regression model is significant using sample data.
- Learn how the regression can be applied to estimate the beta coefficient of a stock.

Preparation:

- ✓ Required reading: read class synopsis and mini-cases.
- ✓ Must-do: download the data files to your laptop.
- Text reading: Chap 14: 14.3–14.8 (skip Using Excel to Compute the Coefficient of Determination, Standard Residuals, Using Excel to Construct a Residual Plot, and Normal Probability Plot).

After-class:

- ✓ Individual Assignment 9: Practice Problem Set 3: 2, 3, 9, 10, 11, 12, 13, 14 on eLearning before 11:45pm on Apr 15.

Class 11 (April 16): Multiple regression and multicollinearity, an application of multiple regression

Learning objectives for this unit:

- Apply multiple regression analysis to business applications.
- Understand the causes, symptoms, and remedies for multicollinearity.
- This class will allow students to practice using the tools they have learned in an application of statistical modeling to business.

Preparation:

- ✓ Required reading: read class synopsis and mini-cases.
- ✓ Must-do: download the data files to your laptop.
- Text reading: Chap 15: 15.1–15.6, 15.8.

After-class:

- ✓ 3rd group assignment is due at 11:45pm on April 29.
- ✓ Individual Assignment 10: submit your peer-review form about your group members on eLearning before 11:45pm on Apr 22.

Review Session for TEST II (April 23): A review session will be provided in class.

TEST II: The test will be held at Testing Center at Synergy Park North 2 building (SP2) on April 30. You have 2 hours to complete the exam. Note that the exam location is NOT the regular classroom.

TEST II covers the second and third course modules. The test is open-eLearning and two double-sided letter-size cheating sheets are allowed. Students are permitted to use Excel in the exam, but any communications among students are strictly forbidden. For preparation, review all your individual assignments from Class 6-Class 11, review your 2nd and 3rd group assignments, and solve the practice test questions.