Management Science Seminar
MSCI 6750

CLASS (DAY/TIME/PLACE): Section 1 from 2-4:50 pm Thursday Meeting in: BLB 075

INSTRUCTOR: Dr. Robert Pavur **Zoom Link:** https://unt.zoom.us/my/pavur

OFFICE: BLB 319-G **E-MAIL:** Pavur@unt.edu ***PUT "MSCI 6750" in SUBJECT LINE***

OFFICE PHONE: ITDS Dept. 565-3107

OFFICE HOURS: 12:30 - 2pm Wed and Thurs or by appointment on Zoom

Textbooks:

Introduction to Mathematical Statistics, Hogg, McKean, Craig, 8th, Prentice Hall, 2019

SUGGESTED REFERENCES

1. Sheldon Ross *A First Course in Probability*, 10th edition, Prentice Hall, 2019 and Ross, S. M., & Peköz, E. A. (2023). *A Second Course in Probability*. Cambridge University Press.

2. Bain and Engelhart, *Introduction to Probability and Mathematical Statistics,* Duxbury Press, 2nd edition, 2000

3. Larsen and Marx, *An Introduction to Mathematical Statistics and Its Applications*, Prentice Hall, 4th edition, 2005

4. Greene, *Econometric Analysis*, Prentice Hall, 5th edition, 2002

5. Jan Kmenta, *Elements of Econometrics*, 2nd Edition, 1997

6. *See inside cover of textbooks for further references.*

Illness Information at the end of the syllabus after Course Outline

COURSE DESCRIPTION

This course focuses on the theoretical principles behind statistical methods used in research, emphasizing both theory and application. Through examples and exercises, students will strengthen their understanding of the theoretical foundations of statistics, preparing them to deepen their knowledge of statistical procedures. A basic understanding of calculus is expected. The course covers topics in both observational and experimental design, and a solid grasp of statistical theory is emphasized for interpreting research papers that involve mathematical notation and concepts. Key topics include hypothesis testing, maximum likelihood estimation, and method-of-moments estimators. Concepts such as consistency, sufficiency, completeness,

and uniqueness in estimation will be discussed, with applications in business research. Additionally, the course will address assumptions, limitations, model identification, and interpretation, with demonstrations in SAS and R. A theoretical understanding of statistical concepts is important to ***reading research papers*** using mathematical notation and concepts.

COURSE OBJECTIVES

1. The primary objective is to provide course participants with theoretical knowledge related to the general topic of statistical methodology, including specific terminology and working knowledge of mathematical statistical procedures. The body of principles studied in this course allows users of statistics to rigorously scrutinize the validity of models used in a variety of business applications, including empirical analysis. Papers from the literature will be presented in class to demonstrate the use of statistical procedures.

2. A distinction is often made between theoretical and applied statistical methodology. This course is oriented to the theoretical and quantitative aspects of statistics, but with an explanation as to the application of techniques to specific problems in business disciplines. Applications where the mathematical statistics topics are used will be discussed.

3. Topics covered in this course will assist students in reading journal articles that refer to mathematical statistics. Research papers often assume that the reader has a fundamental knowledge of underlying mathematical models and concepts in asymptotic statistical theory. This course will assist students in developing the necessary background to read journal articles that use sophisticated quantitative methodology.

PREREQUISITES

BUSI 6450 and BUSI 6220 and ***Calculus***. Students must have a thorough knowledge of multiple regression and ANOVA procedures. Students are also expected to have a solid grasp of the fundamentals of research design, including how to assess the internal and external validity of research designs, as well as how to assess the validity and reliability of multi-item behavioral measures. Students are expected to have a working knowledge of matrix algebra.

EXAMINATIONS & PROJECTS

Two examinations will be given during the semester and a final examination will be given during the week of finals. In addition, short projects will be assigned as part of the exams. **ALL ASSIGNED PROJECTS ARE INDIVIDUAL PROJECTS – NO COLLABORATION!**

CLASS ATTENDANCE:

Regular class attendance and informed participation are expected. Excessive absences could cause one to be automatically dropped from the course with an undesirable grade.

CODE OF CONDUCT AND ETHICS:

The policies stated here were derived from the University of North Texas Student Guidebook. You are responsible for information published by the university in its official publication.

Scholastic integrity must be exhibited in your academic work, conduct, and methods. Academic work for which you receive an individual grade must be your original, individual effort. Although you may discuss assignments with others, the work you submit for a grade must be solely your own. If, in the instructor's opinion, any evidence exists that all or part of the work you submit for grading is that of another person, you (and the other person) will be given a zero for the assignment. This is one form of scholastic dishonesty. A second incident of academic misconduct will result in a grade of F in this course. You (and anyone involved with you) will be given an F in this course, if you are found to have cheated on an exam, or collaborated on an assignment with another student. Further action on incidents of scholastic misconduct will be referred to the dean of Students.

The term "cheating" includes, but not limited to, (1) use of any unauthorized assistance in taking quizzes, tests, or examinations; (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; or (3) the acquisition, without permission, of tests or other academic material belonging to a faculty member or staff of the university.

The term "plagiarism" includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full or clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency in the selling of term papers or other academic materials. (Source: Code of Conduct and Discipline at the University of North Texas.) **http://vpaa.unt.edu/academic-integrity.htm.**

STUDENTS WITH DISABILITIES:

The College of Business Administration complies with the Americans with Disabilities Act in making reasonable accommodation for qualified students with disability. If you have an established disability as defined in the Americans with Disabilities Act and would like to request accommodation, please see me as soon as possible.

MISCELLANEOUS POLICIES:

IMPORTANT DATES: Dates of drop deadlines, exams, final exams, etc., are published in the university catalog and schedule of classes. It is your responsibility to be informed with regard to these dates. Unawareness is no excuse. Email me if you will be missing any classes.

OFFICIAL UNT SYLLABUS STATEMENTS

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

ADA Accommodation Statement. UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that **students must obtain a new letter of accommodation for every semester** and must meet with each faculty member prior to implementation in each class.

Emergency Notification & Procedures. UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence).

Acceptable Student Behavior. Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. **Students engaging in unacceptable behavior will be directed to leave the classroom** and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc.

MSCI 6750 COURSE OUTLINE:

The syllabus below is a ***tentative outline*** for the semester. It is meant to be a guide and several items are subject to change. Exams may be moved up in time. Certain topics may be stressed more or less than indicated. Chapters are in Hogg, McKean, and Craig textbook. Research papers from the quantitative literature will be presented throughout the semester.

MSCI 6750 FALL 2025 Tentative Course Outline

Schedule	Topics	Readings
Aug 21	Overview of Conditional Probability Random Variables Cumulative Random Variables	Chapter 1
Aug 28	Expectation Rules Markov's Inequality Chebyshev's Inequality	Chapter 1
Sept 4	Multivariate Distributions Joint distributions of random variables Transformations – Jacobian	Chapter 2
Sept 11	Joint probability density functions Correlation Coefficient Determining independence of random variables Extensions random variable vectors	Chapter 2
Sept 18	**********Exam I – Chapters 1 & 2 **********	
Sept 25	Widely used distributions of random variables Discrete distributions – Geometric, Poisson Continuous distributions – Gamma, beta	Chapter 3
Oct 2	Project – Modeling Distributions – ***No Class***	
Oct 9	Multivariate normal distribution Contaminated normal distribution	Chapter 3
Oct 16	Consistency, limiting distributions, Convergence in probability ***(note Chapter 5 is covered before Chapter 4)***	Chapter 5
Oct 23	Weak Law of Large Numbers, Convergence in Distribution	Chapter 5

Oct 30	**********Exam II -** Chapters 3 & 5**********	
Nov 6 & Nov 13	Order Statistics & Sampling	Chapter 4
Nov 20	Maximum Likelihood Methods Rao-Cramer Lower Bound Properties off Maximum Likelihood Estimation	Chapter 6
Nov 27	Thanksgiving Week*****UNT CLOSED** ***No Class***	
Dec 4	Efficiency & SAS MLE optimization Hypothesis Testing Fisher Information Matrix	Chapter 6
Dec 11	**Final exam, Thursday 1:30 pm**********	

Illness Information

Regular class attendance and informed participation are expected at a PhD level seminar. However, there are exceptions. It is important for all of us to be mindful of the health and safety of everyone in our community, especially given concerns about any illness or flu. Please contact me if you are unable to attend class because you are ill, or due to health issues. Communicate with me prior to being absent as to what may be preventing you from coming to class.

If you are experiencing cough, shortness of breath or difficulty breathing, fever, or any symptoms of COVID (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider. While attendance is an important, your own health, and those of others in the community, is more important. **Please do not come to campus if you are feeling ill or have a fever. You may Zoom into a lecture if you cannot be physically present.**