

STAT 5388/6388: Multivariate Data Analysis

UTEP Math. Sciences, Spring 2025

Syllabus

COURSE INFORMATION

Course: STAT 5388 (CRN: 20835)/6388 (CRN: 25071)

Credits Hour: 3.0

Lecture: MW 15:00 PM – 16:20 PM, Bell Hall, Room 130A

Prerequisite Courses: MATH 5385 or STAT 5385 (or equivalent) with a grade of “C” or better.

Please check UTEP email and Blackboard frequently. We may announce changes and update about the class in announcement.

INSTRUCTOR INFORMATION

Instructor: Dr. Feng Yu, Assistant Professor

Email: fyu@utep.edu

Office Location: Bell Hall, Room 313

Office Hours: MW 1:30 PM – 3:00 PM at Bell Hall 313 or appointment by email.

TA: MD Saifur Rahman Mazumder

COURSE DESCRIPTION

Concepts of statistical relationships among several variables and methods for inference. Multivariate normal, Hotelling’s T-Squared, multivariate analysis of variance, canonical correlations and principal components.

REQUIRED MATERIALS

Härdle, Wolfgang and Simar, Léopold, [Applied Multivariate Statistical Analysis](#), 2024, 6th Ed.(free downloadable from UTEP library)

Other good textbooks:

- Alan J. Izenman, *Modern Multivariate Statistical Techniques: Regression, Classification, and Manifold Learning*, 1st ed., Springer, 2008
- M. L. Eaton, *Multivariate Statistics: A Vector Space Approach*
- T. Hastie, R. Tibshirani, J. Friedman, *The Elements of Statistical Learning: Data Mining, Inference and Prediction (2/e)*
- K. V. Mardia, J. T. Kent, J. M. Bibby, *Multivariate Analysis*
- D. F. Morrison, *Multivariate Statistical Methods (4/e)*

ASSIGNMENTS/PROJECTS

- Homework problems will be assigned regularly, with submissions required every two weeks. The due date for each assignment will be the week after all problems have been assigned. All homework must be submitted through Blackboard and will be graded.
- For the final project, a data analysis must be done by each team (no more than 3 people) independently, of which the focus must be on multivariate data analysis. An oral presentation to the class will be arranged (10 minutes for each group) during the final week (or the final exam time, TBA) and a written report should be submitted by that time. The written report shall be no longer than 10 pages (including references), should clearly state the research interest, document the analysis, and conclude.

GRADING POLICY

Grade Scaling: To ensure fairness and encourage academic excellence, the highest grade achieved in each assessment (including exams or assignments) will be scaled to 100. All other grades will be adjusted proportionally using the following formula:

$$\text{Adjusted Grade} = \frac{\text{Your Grade}}{\text{Highest Grade}} \times 100 \quad (1)$$

For example, if the highest grade in an exam is 92 and your grade is 80, your adjusted grade will be: $80/92 \times 100 = 86.96$.

Final grade will be calculated based on

- Homework: 30%
- Exam 1: 25%
- Exam 2: 25%
- Final Project: 20%

A bonus of 2% will be given to all students if at least 80% of students fill out the teaching evaluation.

Letter Grade Criteria: Achieving the following percentage ranges is a necessary but not sufficient condition for earning the corresponding letter grade:

- **A:** 90–100%
- **B:** 80–89.99%
- **C:** 70–79.99%
- **D:** 60–69.99%
- **F:** 0–59.99%

MAKE-UP POLICY

- All homework assignment due dates are strictly enforced. As compensation, one of the lowest grades will be dropped at the end of the term.

- Make-up work will be given only in the case of a documented emergency. Note that make-up work may be in a different format than the original work, may require more intensive preparation, and may be graded with penalty points. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me - in advance if possible - and explain with proper documentation why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

TENTATIVE SCHEDULE

- **Week 1:**

- Chapter 1: Descriptive Techniques, Visualization.

- **Week 2:**

- Chapter 2: A Short Excursion into Matrix Algebra.
- Chapter 3: Moving to Higher Dimensions.

- **Week 3:**

- Chapter 4: Multivariate Distributions (Sections 4.1–4.4).
- Chapter 4: Multivariate Distributions (Sections 4.4–4.8).

- **Week 4:**

- Chapter 5: Theory of the Multinormal.
- Chapter 6: Theory of Estimation.

- **Week 5:**

- Chapter 7: Hypothesis Testing.
- Chapter 8: Regression Models.

- **Week 6:**

- Chapter 9: Variable Selection.
- Chapter 10: Decomposition of Data Matrices by Factors.

- **Week 7:**

- Chapter 11: Principal Components Analysis.
- Exam 1.

- **Week 8:**

- Spring Break.

- **Week 9:**

- Chapter 11: Principal Components Analysis (continued).

- Chapter 12: Factor Analysis.
- **Week 10:**
 - Chapter 12: Factor Analysis (continued).
 - Chapter 13: Cluster Analysis.
- **Week 11:**
 - Chapter 13: Cluster Analysis (continued).
 - Chapter 14: Discriminant Analysis.
- **Week 12:**
 - Chapter 15: Correspondence Analysis.
 - Chapter 18: Conjoint Measurement Analysis.
- **Week 13:**
 - Chapter 19: Applications in Finance.
 - Chapter 20: Computationally Intensive Techniques.
- **Week 14:**
 - Special Topics and Review.
- **Week 15:**
 - Exam 2 (TBA).
- **Week 16:**
 - Project Presentations.

ATTENDANCE POLICY

You are encouraged to attend the class in person for optimal class performance. Please note that there are no online class videos provided.

COURSE DROP POLICY

According to UTEP Catalog, “At the discretion of the instructor, a student can be dropped from a course because of excessive absences or lack of effort. A grade of ‘W’ will be assigned before the course drop deadline and a grade of ‘F’ after the course drop deadline.” See Policies and Regulations in the UTEP Undergraduate Catalog for a list of excuse absences. Therefore, if I find that, due to non-performance in the course, you are at risk of failing, I may drop you from the course. I will provide 24 hours advance notice via email.

INCOMPLETE GRADE POLICY

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

TECHNOLOGY REQUIREMENTS

Some course contents are delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

ACADEMIC INTEGRITY POLICY

The University policy is that all suspected cases or acts of alleged scholastic dishonesty must be referred to the OSCCR for investigation and appropriate disposition. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Each student is responsible for notice of and compliance with the provisions of the Regents' Rules and Regulations, which are available for inspection electronically at <http://www.utsystem.edu/bor/rules/homepage.htm>. All students are expected and required to obey the law, to comply with the Regents' Rules and Regulations, with System and University rules, with directives issued by an administrative official in the course of his or her authorized duties, and to observe standards of conduct appropriate for the University. A student who enrolls at the University is charged with the obligation to conduct himself/herself in a manner compatible with the University's function as an educational institution. Any student who engages in conduct that is prohibited by Regents' Rules and Regulations, U. T. System or University rules, specific instructions issued by an administrative official or by federal, state, or local laws is subject to discipline, whether such conduct takes place on or off campus or whether civil or criminal penalties are also imposed for such conduct.

DISABILITY & ACCOMMODATION POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS), see <https://www.utep.edu/student-affairs/cass>. Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the CASS portal.

MILITARY STATEMENT

If you are a military student with the potential of being called to military service and/or training during the semester, please contact me by the end of the first week of class.

COVID-19 ACCOMMODATIONS

Students are not permitted on campus when they have a positive COVID-19 test, exposure or symptoms. If you are not permitted on campus, you should contact me as soon as possible, so we can arrange necessary and appropriate accommodations.