

	Course	STAT 5351.001 Probability and Statistics I
	Professor	Min Chen
	Term	Fall 2024
	Meetings	Tu/Th 2:30-3:45 PM, SLC 1.202

Professor's Contact Information

Office & Email	FO 3.704 H (mchen@utdallas.edu)
Office Hours	Tu/Th 1PM-2PM
Other Information	eLearning at https://elearning.utdallas.edu/ will be used for posting course materials.

Teaching Assistant

Name	Posted in eLearning
Email	
Office Hours	

Course Modality and Expectations

Instructional Mode	The instructional mode for the course is face-to-face.
Course Platform	Lecture.
Expectations	• To submit your assignment on time. • To be engaged in class activities. • To spend an adequate amount of time on the homework each week, and to make an effort to solve problems in mini projects. • To engage with both the abstract and computational sides of the course material. • To seek help when appropriate.

Class Participation

Regular class participation is required. 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](#).

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 Accessibility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Calculus through multivariable calculus or equivalent.

Course Description

This course is taught as the first in a two-semester sequence, the second being STAT 5352 Probability and Statistics II. The sequence broadly covers (i) the most central probability concepts, methods, and tools, (ii) classical statistical decision theory and inference, and (iii) relevant applications that motivate and illuminate the theory and methods.

STAT 5351 emphasizes *probability theory and models*, and STAT 5352 emphasizes *statistical methodology and inference*.

Whereas *probability* is one of the rather beautiful topics within mathematics, *statistical science* is a separate discipline with its own special concepts which become implemented using tools from probability, other mathematical topics, and computer science.

Topics in STAT 5351: Review of Combinatorial Methods and Binomial Coefficients. Probability Models, Conditional Probability, and Bayes' Theorem. Random Variables, Probability Distributions, and Probability Densities. Expected Value, Moments. Chebyshev's Inequality. Conditional Expectation. Binomial, Hypergeometric, Poisson, and other Discrete Probability Distributions. Exponential, Gamma, Normal, and other Continuous Probability Distributions. Functions of Random Variables. Sampling Distributions.

Student Learning Objectives/Outcomes

A working understanding of basic probability concepts, theory, and tools, and their techniques of application.

Required Textbooks and Materials

1. *John E. Freund's Mathematical Statistics with Applications*, 8th edition, Miller and M. Miller, 2014, Pearson
2. *Probability and Statistics for Actuaries*, 1st edition, N. Humphreys, and Y. Koshevnik, Cognella.

Textbooks and some other bookstore materials can be ordered online or purchased at the [UT Dallas Bookstore](#).

Suggested Course Materials

- *simpleR – Using R for Introductory Statistics*
- *An Introduction to R*

- *Introduction to Probability and Statistics Using R* (The PDF files of these three books are available on eLearning)
- *Advanced R* (Its HTML file is available at <http://adv-r.had.co.nz>)

Technical Requirements

In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the [Getting Started with eLearning](#) webpage.

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 a web conferencing tool may also be used during the semester. For more details, please visit the [Student eLearning Tutorials](#) webpage for video demonstrations on eLearning tools.

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.

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.

Academic Calendar

8/20	Tue	§§ 1.1-1.2. Combinatorial Methods.
8/22	Thu	§§ 1.3-1.4. The Binomial Coefficients. The Theory in Practice (Reading).
8/27	Tue	§§ 2.1-2.3. Sample Spaces. Events.
8/29	Thu	§§ 2.4-2.5. The Probability of an Event. Some Rules of Probability.
9/3	Tue	§§ 2.6-2.7. Conditional Probability. Independent Events.
9/5	Thu	§§ 2.8-2.9. Bayes' Theorem. The Theory in Practice.

9/10 Tue	§§ 3.1-3.2. Random Variables. Discrete Probability Distributions.
9/12 Thu	TEST 1 on 08/20-09/05
9/17 Tue	§§ 3.3-3.4 Continuous Random Variables. Probability Density Functions.
9/19 Thu	§§ 3.5. Multivariate Distributions.
9/24 Tue	§§ 3.6. Marginal Distributions.
9/26 Thu	§§ 3.7-3.8. Conditional Distributions. The Theory in Practice.
10/1 Tue	§§ 4.1-4.3. The Expected Value of a Random Variable. Moments. Variance.
10/3 Thu	§§ 4.4-4.5. Chebyshev's Inequality. Moment-Generating Functions.
10/8 Tue	§§ 4.6-4.9. Product Moments. Covariance. Moments of Linear Combinations of Random Variables. Conditional Expectations. (The Theory in Practice.)
10/10 Thu	TEST 2 on 09/10-10/03
10/15 Tue	§§ 5.1-5.5. Discrete Distributions: Uniform, Bernoulli, Binomial, Negative Binomial, Geometric
10/17 Thu	§§ 5.6-5.8. Further Discrete Distributions: the Hypergeometric, Poisson and Multinomial.
10/22 Tue	§§ 5.9-5.10. The Multivariate Hypergeometric Distribution. The Theory in Practice.
10/24 Thu	§§ 6.1-6.3. Continuous Distributions: the Uniform, Gamma, Exponential, and Chi-Square.
10/29 Tue	§§ 6.4-6.6. The Beta and Normal Distributions. Normal Approximation to the Binomial Distribution.
10/31 Thu	§§ 6.7-6.8. The Bivariate Normal Distribution. The Theory in Practice.
11/5 Tue	§§ 7.1-7.2. The Distribution Function Technique.
11/7 Thu	TEST 3 on 10/08-10/31
11/12 Tue	§§ 7.3. The Transformation Technique with One Variables.
11/14 Thu	§§ 7.4. The Transformation Technique with Two Variables.
11/19 Tue	§§ 7.5-7.6. The Moment-Generating Function Technique. The Theory in Application.
11/21 Thu	§§ 8.1-8.3. The Sampling Distribution of the Sample Mean: Infinite and Finite Population Cases.
11/26 Tue	<i>Fall Break – UTD Closed</i>
11/28 Thu	<i>Thanksgiving Day – UTD Closed</i>
12/3 Tue	§§ 8.4-8.6. Sampling from a Normal Population: Roles of the Chi-Square, t, and F Distributions.
12/5 Thu	TEST 4 on 11/05-12/03

Course Policies

Tests	There will be <u>4 closed-book 60-minute tests</u>, each based on the course content (text, class lectures, recommended exercises, materials supplied in eLearning) over a specified range of dates. Thus the course will be taught in a <u>modular</u> style, although it must be understood that each module will not only present new content but also draw upon the content of previous modules. The tests are not intended to strain memory. However, as a practical matter, we do need to be able to call forth from memory at least some basic information and details, and to be able to apply the theory and methods in particular application contexts. If a very complicated formula is needed in a test, it will be provided, but relatively simple formulas must be recalled from memory. <i>Depth and scope of understanding of concepts and methods, and of their techniques of application, will be tested.</i>
Homework	You can find weekly homework assignment on eLearning. You must turn in an electronic copy of your assignment in eLearning for grading.
Grading Criteria	1. The <u>lowest grade of Tests 1-3 will be dropped</u>. The remaining two test grades plus the Test 4 grade will be averaged together and count for 70% of the overall course score. <u>The Test 4 grade will not be dropped</u>. 2. Homework grade will count for 25% of the overall course score. 3. Participation will count for 5% of the overall course score. <i>The course grade is based on the overall score</i>, as follows: A 93-100; A- 90-92.9999; B+ 85-89.9999; B 80-84.9999; B- 75-79.9999; C+ 70-74.9999; C 60-69.9999; F 0-59.9999. EXAMPLE: An overall score of 89.9999 receives the grade of B+. The grade of A- starts with a score of 90.0000. Rounding of overall scores is not carried out. <i>Letter grades are assigned according to these stated intervals.</i> <i>In the interest of equitable treatment of all students, no individual requests for special projects, extra assignments, extra tests, etc., will be granted.</i>
Make-up Policy	No make-up work will be given unless there is a serious medical emergency and appropriate documentation is provided in a timely manner.
Extra Credit	No extra credit work will be assigned.
Late Work	No late work will be accepted. It may be possible to submit the work early.

Student Conduct and Discipline	The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of university business. General information on student conduct and discipline is contained in the UTD publication, <i>A to Z Guide</i> , provided to all registered students each academic year.
Academic Integrity	The faculty expects from students a high level of responsibility and academic honesty. Students guilty of academic dishonesty are subject to disciplinary proceedings.
Withdrawal	Deadlines for withdrawal from courses are published in each semester's course catalog. A faculty member cannot drop or withdraw a student. Rather, it is the student's responsibility to handle withdrawal procedures with the Registrar.
Incomplete Grades	As per university policy, incomplete grades are granted only in the case of work unavoidably missed (and excused) and not already covered by the professor's policy on missed work or activities, and only if at least 70% of the course work has been completed. An incomplete grade must be resolved within eight 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 becomes changed automatically to F.
Campus Carry	The University's concealed handgun policy is posted on the campus carry website: https://www.utdallas.edu/campuscarry/ .

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 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.