

STAT 4352: Mathematical Statistics

University of Texas at Dallas

Class time: Monday, Wednesday (2:30pm – 3:45pm)

Section: 001

Classroom: SCI 3.230

Instructor: Emmett B. Kendall

Email: Emmett.Kendall@UTDallas.edu

Office: FO 2.106

Office Hours: Monday, Wednesday: 3:45pm – 5:00pm in FO 2.106 (or by appointment)

Course Description

- Review of sampling distribution and other distributions commonly used in statistical inference
- Properties of point estimation – unbiasedness, efficiency, consistency, sufficiency, and robustness
- Methods of estimation – method of moments, maximum likelihood, and Bayesian estimation
- Interval estimation
- Hypothesis testing – Neyman-Pearson lemma, power function and likelihood ratio test
- Tests of hypothesis involving means, variances and proportions
- Regression models, experimental design and analysis, and nonparametric tests

Learning Outcomes

- Theoretical understanding of statistical estimation and inference
- Familiarization with regression models and their applications
- Introduction to nonparametric tests

Prerequisites

Required: STAT 4351 (*Probability*)

Recommended: Proof-based linear algebra and/or calculus.

Course Materials

- **No required textbook.** Lecture notes will provide all necessary information.
- Supplemental reference:
 - Hogg and Craig, Introduction to Mathematical Statistics, 8th Ed. Prentice Hall. [\[pdf\]](#)

Course Policies

- **Attendance and Participation**

- Attendance is **mandatory**.
- Attendance will be taken at the start of each class. If you are late to class, please confirm attendance with the instructor after the lecture is complete.
- Excused absences are allowed with supporting documentation, and preferably forewarning.
- Each lecture counts for 1 point of attendance, and the total course attendance grade is the average of points across all lectures (excluding the first lecture for drop/add week).
- Student participation in class promotes greater collective interest amongst all students in the class and helps break up the monotony of standard lectures.

- **Homework**

- Homework will be assigned [mostly] weekly and [mostly] on Wednesdays immediately after class and will be due at 11:59pm a week later.
- No late homework will be accepted. In the event of prolonged health or other issues, arrangements can be made on an individual basis for students. If you are falling behind, please reach out to the instructor as soon as possible.
- The lowest **two** homework grades will be dropped at the end of the semester.
- Collaborating with fellow students on homework is **encouraged**. However, unique solutions must be written for each student (no copy-pasting anyone's solutions).
- Take responsibility in truly understanding the solutions to the assignments. You may use resources like StackExchange, but convince yourself that those solutions are correct (same goes for ChatGPT).
- Learn to understand **what you know versus what you do not know**. This is critical for studying for exams and learning how to best use your time outside of class.
- Highly encouraged to type homeworks using LaTeX (or other text-editors). LaTeX templates will be provided, and learning LaTeX is a valuable skill to know, regardless. I recommend using [Overleaf](#) when starting LaTeX.

- **Exams**

- No make-up exam will be given unless there is a documented emergency.
- All exams are closed-book and closed-notes. Any communication with other students or use of cellular devices is strictly prohibited during exams.
- A study guide and exam outline will be provided before each exam.
- I will not test you on anything you have not seen and will provide a breakdown of what to expect leading up to the exam.
- My goal is to fairly test your understanding of the topics discussed in lectures, as well as practiced over homework. Therefore, it behooves you to take the subject matter seriously and ask questions if anything is not understood.

- **Extra Credit**

- No extra credit will be assigned, so please do **not** email the instructor or TA for extra assignments or extra credit.
- The course **may** be subject to an overall curve at the very end of the semester (which could only improve your grade).

Grading Criteria

Component	Weight
Homework	20%
Attendance	25%
Midterm Exam	25%
Final Exam	30%

Grading Scheme (*tentative*)

A+	98 – 100	A	93 – 97.9999	A-	90 – 92.9999
B+	87 – 89.9999	B	83 – 86.9999	B-	80 – 82.9999
C+	77 – 79.9999	C	73 – 76.9999	C-	65 – 72.9999
D+	60 – 64.9999	D	55 – 59.9999	D-	50 – 54.9999
F	0 – 49.9999				

Course Schedule (*tentative*)

Class #	Date	Topic	Homework
1	W: Jan. 21	Course overview & logistics	
2	M: Jan. 26	Change of variables	
3	W: Jan. 28	Sampling distribution	HW1 assign
4	M: Feb. 02	Sampling distribution	
5	W: Feb. 04	Order statistics	HW2 assign; HW1 due
6	M: Feb. 09	Asymptotic distribution	
7	W: Feb. 11	Asymptotic distribution	HW3 assign; HW2 due
8	M: Feb. 16	Method of moments estimator	
9	W: Feb. 18	Maximum likelihood estimator	HW4 assign; HW3 due
10	M: Feb. 23	Maximum likelihood estimator	
11	W: Feb. 25	Exponential family, MLE, sufficiency	HW5 assign; HW4 due
12	M: Mar. 02	Midterm review	
13	W: Mar. 04	Midterm	
14	M: Mar. 09	Exponential family, MLE, sufficiency	
15	W: Mar. 11	Comparison of estimators	HW6 assign; HW5 due
16	M: Mar. 16	Spring break	
17	W: Mar. 18	Spring break	
18	M: Mar. 23	Comparison of estimators	
19	W: Mar. 25	Statistical decision theory	HW7 assign; HW6 due
20	M: Mar. 30	Likelihood ratio test	
21	W: Apr. 01	Likelihood ratio test	HW8 assign; HW7 due
22	M: Apr. 06	Comparison of tests	
23	W: Apr. 08	Comparison of tests	
24	M: Apr. 13	Comparison of tests	
25	W: Apr. 15	Regression	HW9 assign; HW8 due
26	M: Apr. 20	Linear regression (estimation)	
27	W: Apr. 22	Linear regression (testing)	HW10 assign; HW9 due
28	M: Apr. 27	Introduction to Bayesian statistics	
29	W: Apr. 29	Introduction to Bayesian statistics	HW10 due
30	M: May 04	Code review	
31	W: May 06	Final exam review	
	TBD	Final Exam	

Accommodations for Students with Disabilities

The University of Texas at Dallas is committed to providing reasonable accommodations for all persons with disabilities. The syllabus is available in alternate formats upon request. If you are seeking classroom accommodations under the Americans with Disabilities Act (2008), you are required to register with the AccessAbility Resource Center, located in the Administration Building (AD), Suite 2.224. Their phone number is 972-883-2098, email: accessability@utdallas.edu and website is <https://accessability.utdallas.edu>. To receive academic accommodations for this class, please obtain the proper AccessAbility Resource Center letter of accommodation and meet with me at the beginning of the semester.

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students. Please go to the [Academic Support Resources](#) webpage for these policies.

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.

Student emails and discussion board messages will be answered within 3 working days under normal circumstances. If not, please send it again.

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.

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 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.