Syllabus

Math 453: Mathematical Statistics

Course Information

Term: Spring 2026

Instructor: Isaac Quintanilla Salinas

Contact: isaac.qs@csuci.edu

Office Location: Marin 2326

Office Hours:

Lecture:

Pre-Requisites: MATH 201 or MATH 202/PSY 202 or MATH 300 or MATH 352

Course Description

This course is an introduction to mathematical statistics with an emphasis on statistical estimation and hypothesis testing. The course will be comprised of both theory and applications. We begin with a condensed review of fundamental concepts from Math 352; particularly, we briefly review important discrete and continuous probability distributions. We will then begin our discussion on the main topic of this course, statistical inference, through the study of distributions of functions of random variables using the method of moment-generating functions and order statistics. We then discuss ideas of convergence with sampling distributions and the central limit theorem. Next, we consider the topics of estimation, properties of point estimators, and methods of estimation. Finally, we study the theory of statistical tests and likelihood ratio tests. Depending on time, other topics may be added or removed.

Learning Outcomes

1. Demonstrate statistical knowledge and apply it to various data sets.
2. Use basic principles of statistical inference (both Bayesian and frequentist).
3. Build a starter statistical toolbox and discuss the utility and limitations of these techniques.
4. Use software and simulation to do statistics.
5. Demonstrate ability to discuss statistical information in oral and written form.

Required Texts

1. Modern Mathematical Statistics (MMS) with Applications, by Jay L. Devore and Kenneth N. Berk , **Third Edition**, Springer, 2021. (available online for free through the Broome Library).

Course Grading

Category	Percentage
Homework	25%
Exam 1	25%
Exam 2	25%
Exam 3	25%

At the end of the quarter, course grades will be assigned according to the following scale:

A+	98 − 100	**B+**	87 − <90	**C+**	77 − <80	**D+**	67 − <70

A	93 – <98	B	83 – <87	C	73 – <77	D	63 – <67	F	< 60
A−	90 - <93	B-	80 – <83	C−	70 – <73	D−	60 – <63		

Class Attendance

Students are expected to attend in-person to class to learn the material.

Canvas

Students are expected to check the course Canvas page 3-4 times a week to view assignments, announcements, and other course-related materials.

Homework

Homework will be assigned on a regular basis and posted on https://m453.inqs.info/hw.html and CANVAS. All homework assignments are due at the beginning of class. The homework is to help you practice the concepts learned in lecture and to help you study. You must turn in your own individual homework and show your understanding of the material. At the end of the semester, the three lowest homework grades will be dropped.

Exams

There will be three exams and Final.

Exam #1 will most likely be during the 6th week of the semester. Exam #2 will most likely be during the 11th week of the semester. **Exam #3 will be on MAY X, 2026 .**

While the exams are not considered cumulative, the material builds on each other. Developing a strong understanding of the material through out the course is important for your success.

At the end of the semester, your lowest exam grade will be replaced by your median average of all exam grades.

This course will operate under a zero-tolerance policy. Talking during the time of the exam, sharing materials, looking at another students' exam, or not following directions given will be subject to the

University's academic integrity policy.

Extra Credit

There will be 3 extra credit opportunities worth a total of 5% of your overall grade. (There are no make-ups for missed extra credit assignments!) More information will be provided on the extra credit assignments on a later date.

Class Schedule

The following outline may be subject to change. Any changes will be announced in class.

Week	Lecture	Topic	Reading
1 1/26-1/30	1 Tuesday	Introduction to Statistics	1.1-1.4
	2 Thursday	Review: RV and Distribution Function	3.1, 3.5-3.7, 4.1, 4.3-4.5
2 2/2-2/6	3 Tuesday	Review: Moment Generating Functions	3.4, 4.2
	4 Thursday	Transonformation of Random Variables	4.7
3 2/9-2/13	5 Tuesday	Joint Distributions	5.1, 5.2
	6 Thursday	Linear Combinations and Conditional Distributions	5.3, 5.4
4 2/16- 2/20	7 Tuesday	Functions of RV's and Order Statistics	5.6, 5.7
	8 Thursday	Sampling Distributions	6.1, 6.2
5 2/23-2/27	9 Tuesday	Common Sampling Distributions	6.3, 6.4
	10 Thursday	Exam #1	

Week	Lecture	Topic	Reading
6 3/2-3/6	11 Tuesday	Point Estimation	7.1
	12 Thursday	Maximum Likelihood Estimator	7.2
7 3/9-3/13	13 Tuesday	Method of Moments Estimator	7.2
	14 Thursday	Bayesian Estimators	15.2
3/16-3/20	**Spring Break**		
8 3/23-3/27	15 Tuesday	Sufficiency	7.3
	16 Thursday	Information and Efficiency	7.4
9 3/30-4/3	17 Tuesday	Holiday	8.1
	18 Thursday	Confidence Intervals	8.1
10 4/6-4/10	19 Tuesday	Single Sample Intervals	8.2
	20 Thursday	Proportion Intervals	8.3
11 4/13-4/17	21 Tuesday	Intervals for Variance	8.4
	22 Thursday	Exam #2	
12 4/20-4/24	23 Tuesday	Hypothesis Testing	9.1
	24 Thursday	Tests for Population Mean	9.2
13 4/27-5/1	25 Tuesday	Tests for Population Porportion	9.3
	26 Thursday	P-Value	9.4
14 5/4-5/8	27 Tuesday	Neyman-Pearson Lemma and Likelihood Ratio Test	9.5
	28 Thursday	Two-Sample Tests	10.1-10.2
15 5/11-5/15	29 Tuesday	Simple Linear Regression	12.1
	30 Thursday	Estimation and Inference	12.2-12.4
16 5/18		Exam #3	

Generative Artificial Intelligence Policy

The use of generative artificial intelligence (AI) in an ethical manner is permitted for this course.

Permitted Uses

You may use AI for:

- Obtain clarification

- Brainstorming ideas, examples, outlines, and strategies

- Generating questions for practice or exploration

- Identifying keywords or phrasing to match professional goals

Prohibited Uses

You may not:

- Submit AI-generated work

- Use AI to complete assignments, quizzes, exams, or other assessments meant to reflect only your own work

- Use AI to generate code

Any AI-generated work will receive a 0 in the class. Severe cases will be reported to Academic Misconduct.

You may not upload any course material to any AI platforms such as ChatGPT, Claude, Meta AI, and Google Gemini. Exceptions are allowed for DASS-approved services.

University Policies

Syllabus Policies and Assistance

CSUCI's Syllabus Policies and Assistance Website provides important details about academic policies, campus expectations, and student support services that are all highly applicable to your success as a student both in and outside of the classroom. Ensure that you review this site on a regular basis to stay informed about the policies and resources that support your success, as campus resources or policies may change semester to semester.

Academic Honesty

Conduct yourself with honesty and integrity. Do not submit others' work as your own. Foassignments and quizzes that allow you to work with a group, only put your name on what the group submits if you genuinely contributed to the work. Work completely independently on exams, using only the materials that are indicated as allowed. Failure to observe academic honesty results in substantial penalties that can include failing the course.

CSUCI Basic Need

Please use the link to the Basic Needs Program on the Syllabus Policies and Assistance website (<go.csuci.edu/syllabuspolicies>) for information on emergency food, housing accommodations, toiletries, and connections to critical resources.

CSUCI Disability Statement

If you are a student with a disability requesting reasonable accommodations in this course, you need to contact Disability Accommodations and Support Services (DASS) located on the second floor of Arroyo Hall, via email accommodations@csuci.edu or call 805-437-3331. All requests for reasonable accommodations require registration with DASS in advance of need: https://www.csuci.edu/dass/students/apply-for-services.htm. Faculty, students and DASS will work together regarding classroom accommodations. You are encouraged to discuss approved.

Disruption

1. **If I Am Out:** I will communicate via email and will hold classes asynchronously.
2. **If You Are Out:** Contact me as soon as possible to talk about your options. Reasonable accommodations will be provided for a brief absence. With proper documentation, extended accommodations will be provided.