Syllabus: MATH 408-Mathematical Statistics. Spring, 2021.

Class time: MWF 12:00 PM - 12:50 APM.   **Class Location**: Zoom ID:999 5884 2680.
Instructor: Qi Feng   **Email**: qif@usc.edu
Office: KAP 406H (Zoom ID: 665 578 3594)   **Section**: 39978
Office hours: Wednesday 1:00-2:00 p.m., Friday 2:00-3:00 p.m. or by appointment.
Textbook: Mathematical Statistics with Applications, 7th Edition.
Author: Dennis D. Wackerly, William Mendenhall III, Richard L. Scheaffer
Teaching Assistant: Yusheng Wu   **Email** yushengw@usc.edu
Discussion Time: 10:00-10:50, 11:00-11:50.   **Location**: Zoom Id:

Course description: This is an upper-division undergraduate mathematical statistics course that introduces the basic mathematical properties of statistical methods for data analysis including parametric estimation, hypothesis testing, least square estimation, analysis of variance and analysis of categorical data.

Course webpage: *Blackboard* will be used in this course, grades, course announcements and weekly homework assignments will be updated here. Detailed weekly course schedule will be updated at my course webpage *MATH408*.

Homework: There will be 15 weeks of lectures and 12 homework assignments. A weekly (or so) homework will be assigned and will be due the following Thursday during the discussion sections. The homework assignment will be due *at the beginning of the class* on the day it is due. Anything after that will be considered late and can only receive 50% credits. All the homeworks should be submitted through blackboard.

Quizzes: Quizzes will be given on Thursday discussion session, except for the 1st week and the two midterm exam weeks. The quizzes last 10-15 minutes, and cover the materials similar to the lectures and Homework during the same week. There will be no make-up quizzes under any circumstances. The lowest quiz score will be dropped.

Exams: There will be **one 50-min in-term exams** (scheduled for March 1st), as well as a final exam. If you miss the in-term exam for a *documented* reason (illness or some other extraordinary circumstance), your score on the final exam will be used in the grade calculations instead. If there is any conflict with previously announced religious holiday, the student should contact the professor two weeks prior to the scheduled exam in order to arrange another time.

The in-term exam will focus on the materials covered since the beginning of the semester. The final will be cumulative. Electronic devices, textbooks and notes are not allowed in the exams.

Final Project: The final project includes one Project mid-Evaluation Report (Due by April 9th.) and a final presentation.

Grading: Here is how your final grade will be composed:

Homework	10%
Quizzes	15%
In-term Exam 1	20%
Final Project and Presentation	27%
Final Exam	28%

and here is how the letter grade will be assigned (the second row refers to your final percentage score)

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93 - 100	90 - 93	86 - 90	83 - 86	80 - 83	76 - 80	73 - 76	70 - 73	66 - 70	63 - 66	60 - 63	0 - 59

Academic Honesty: **Cheating is not tolerated.** Everything that you present as your own work (especially the work that is supposed to be graded) should, in fact, be your own work, and not something copied from an external source. In case that a student is caught in violation of the principles of academic honesty enforced at USC, please review the Trojan Integrity Guide. All students are expected to be aware and abide by these standards.

Accommodations: Any student requesting accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodation can be obtained from DSP. Please be sure the letter is delivered to me as early as possible during the semester.

Disclaimer: The instructor reserves the right to make changes of the syllabus and schedule at any time. Below is a tentative schedule and will be updated weekly on course webpage.

Week	Date	Section	Topic
1	1/15	Basics	Discrete & Continuous Random Variable
2	1/18 1/20 1/22	**M. L. King's Birthday** Chapter 5 Chapter 7	**No Class** Multivariate Probability Distribution: Inequalities, WLLN, SLLN.
3	1/25 1/27 1/29	Chapter 7 Chapter 8 Chapter 8	Central Limit Theorem Introduction Point Estimator examples
4	2/1 2/3 2/5	Chapter 8 Chapter 8 Chapter 8	Goodness & Confidence Intervals Sample size, t & F-distribution More Confidence Intervals
5	2/8 2/10 2/12	Chapter 9 Chapter 9 Chapter 9	Efficiency & Consistency & Sufficiency Rao-Blackwell Thm & MVUE Methods of Moments (MMEs)
6	2/15 2/17 2/19	**President's Day** Chapter 9 Chapter 9	**No Class** Maximum Likelihood (MLE) MLE & Confidence Intervals.
7	2/222 2/24 2/26	Chapter 9 Chapter 10 Chapter 10	MLE and Fisher information. Hypothesis testing & alpha, beta, P-value, Power: I Hypothesis testing & alpha, beta, P-value, Power; II
8	3/1 3/3 3/5	**Exam day** Chapter 10 Chapter 10	**Exam 1** Hypothesis test: finer examples: I Hypothesis test: finer examples: II
9	3/8 3/10 3/12	Chapter 10 Chapter 10 **Wellness Day**	Confidence Interval & Small Sample & likelihood ratio Likelihood ratio tests and Hypothesis test **No Class**
10	3/15 3/17 3/19	Chapter 11 Chapter 11 Chapter 11	Linear Models: SSE Linear Models: finer property Linear Models: Hypothesis test.
11	3/22 3/24 3/26	Chapter 11 Chapter 11 Chapter 11	Linear regression line and prediction. Multilinear Regression: model set up. Multilinear Regression: F test.
12	3/29 3/31 4/2	Chapter 11 Chapter 13 Chapter 13	Multilinear Regression: Python. ANOVA: I ANOVA: II
12	4/5 4/7 4/9	Chapter 13 **Wellness Day** Chapter 13	ANOVA: III **No Class** ANOVA: IV
14	4/12 4/14 4/16	Chapter 14 Chapter 14 Chapter 14	Analysis of Categorical Data: I Analysis of Categorical Data: II Analysis of Categorical Data: III
15	4/19 4/21 4/23	Chapter 14 Chapter 14 Final project	Analysis of Categorical Data: IV Analysis of Categorical Data: V Final project presentation: I
16	4/26 4/28 4/30	Final project Final project **Wellness Day**	Final project presentation: II Final project presentation: III **No Class**
17	May 5-12	**Final Exam**	Time: TBA