

Course Instructors and Meetings

Course Instructors:

- **Instructor:** Suzanne S. Sindi **Email:** ssindi@ucmerced.edu
Office Hours: Tuesday, 1:30 - 2:30pm, Wednesday, 4 - 5pm ([Zoom Link](#))
Lecture: Section 01: Tuesday&Thursday 10:30-11:45am ([Zoom link](#))
- **Instructor:** Lihong Zhao **Email:** lzhao33@ucmerced.edu
Office Hours: Monday, 9:00 - 9:50am ([Zoom link](#)), Thursday, 3:00 - 4:10pm ([Zoom link](#))
Lecture: Section 10: Tuesday&Thursday 12:00-1:15pm ([Zoom link](#))

Appointment: If none of the instructor office hours work with your schedule, or you would prefer to discuss in a private meeting, you can make an appointment with your course instructor by email. Remember to indicate *all the times you are available and include "Math 32" in the subject line!*

Course Lecture Times: Because this is not a normal semester, your course lectures will be different than a standard semester in two different ways.

- Lectures will occur synchronously during their scheduled time. The "official" lecture will be only the first 30 minutes of the scheduled class. The remainder of the time will be spend answering in an open office-hour type discussion where questions can be answered.
- Official lectures will be supplemented with several short videos for you to view outside of class lectures.

Teaching Assistants, Discussion Sections and Office Hours: Along with the instructors, this course has six teaching assistants each of which have at least two office hours. When combined with the instructors office hours this leads to 12+ additional hours outside of class! If you can not attend any of the office hours, or would like additional support, please email your TA to set up a time (**be sure to indicate your available times and with "Math 32" in the subject line!**). **You are required to go to the discussion section you registered.**

- **TA:** De Zhen Zhou **Email:** dzhou5@ucmerced.edu
Office Hours: Monday, 09:30-10:30am & Monday 12:00-1:00pm ([Zoom](#))

Discussion Sections:

Section 02: Tuesday, 1:30-3:20pm ([Zoom](#)).
Section 03: Tuesday, 3:30-5:20pm ([Zoom](#)).

- **TA:** Julio Zepeda **Email:** jzepeda31@ucmerced.edu
Office Hours: Tue, 9:30-10:30am & Wed, 3:30-5:30pm ([Zoom](#))

Discussion Sections:

Section 04: Tuesday, 2:30-4:20pm ([Zoom](#))
Section 05: Wednesday, 11:30-1:20pm ([Zoom](#))
Section 06: Friday, 1:30-3:20pm ([Zoom](#))

- **TA:** Derek Sollberger **Email:** dsollberger@ucmerced.edu
Office Hours: Wednesday, 4:00-6:00 pm ([Twitch](#)) ([Discord invite link](#))

Discussion Sections:

Section 07: Wednesday, 11:30-1:20pm ([Zoom](#))
Section 08: Monday, 1:30-3:20pm ([Zoom](#))
Section 11: Monday, 5:30-7:20pm ([Zoom](#))

- **TA:** Daisy Duarte **Email:** dduarte6@ucmerced.edu
Office Hours: Monday 4:00-5:00pm & Wednesday 3:00-4:00pm ([Zoom](#))

Discussion Sections:

Section 12: Monday, 1:30-3:20pm ([Zoom](#))
Section 13: Monday, 11:30-1:20pm ([Zoom](#))

- **TA:** Anna Kucherova **Email:** akucherova@ucmerced.edu
Office Hours: Tuesday, 8:30-10:30am ([Zoom](#))

Discussion Sections:

Section 14: Friday, 7:30-9:20am ([Zoom](#))
Section 15: Monday, 7:30-9:20am ([Zoom](#))

- **TA:** Haik Stepanian **Email:** hstepanian@ucmerced.edu
Office Hours: Monday, 1:30-3:30pm & ([Discord](#))

Discussion Section:

Section 16: Monday, 11:30-1:20pm ([Zoom](#))

Course Goals & Learning Objectives

Course Goal: This course will help students gain an understanding of elementary probability theory and statistics and be comfortable applying these theories to data. This course provides an opportunity for students to see how various mathematical knowledge and techniques which they have learned in different courses unite together to serve a common purpose.

Learning Objectives: Upon completing Math 32, students should understand

- Basic concepts of probability theory including sample spaces, events, independence and conditional probability.
- The concept of random variables, properties of common types of random variables, how to identify them and use them to solve probabilistic problems.
- The evaluation and interpretation of descriptive statistics
- The idea of constructing statistical models and applying these models to data.
- Basic problems of inferential statistics including finding the maximum likelihood estimator and, if time permits, confidence intervals.
- Skill and confidence in conducting analysis in “real-world” data.

Learning Outcomes: Upon completing Math 32, students should be able to:

1. Understand and be able to explain basic concepts of probability theory including events, independence, conditional probability, mean/expectation, variance, covariance, correlation

2. Find either the distribution function or the density (mass) function of a given random variable and use it to compute its mean, variance and probability of given events.
3. Compute probabilities, expectations, covariances and correlations of jointly distributed random variables.
4. Understand the Law of Large Numbers.
5. Represent data graphically and compute statistical properties from the data.
6. Compute and determine the error in estimating the mean and variance of a model from data. Understand the bias in such estimators.
7. Use maximum likelihood estimation to determine parameters related to a probability model from data.
8. Write and run “simple” R programs for the purposes of data analysis, modeling, and visualization.

Program Learning Outcomes Math 32 meets the following PLOs:

1. Solve mathematical problems using analytical methods.
2. Solve mathematical problems using computational methods.
3. Recognize the relationships between different areas of mathematics and the connections between mathematics and other disciplines.
4. Give clear and organized written and verbal explanations of mathematical ideas to a variety of audiences.
5. Model real-world problems mathematically and analyze those models using their mastery of the core concepts.

Course Materials

Course web site: Please get in the habit of regularly checking both your email and the CatCourses web site for this class. Email announcements will be frequent and important.

Textbook: The book is free online, assuming you are connected to the campus virtual-private network (VPN), at [this link](#). Don't have the campus VPN set up yet? Check [Campus VPN Information](#).

Title: A Modern Introduction to Probability and Statistics

Authors: F.M. Dekking, C. Kraaikamp, H.P. Lopuhaä, and L.E. Meester

R Programming: R is a free scientific computing environment (similar to Matlab), focused on applications in probability and statistics. R works equally well on Windows, Linux, and Mac systems. In Discussion, you will learn to use R in the [R-studio environment](#) and (hopefully) in an R-Studio Cloud environment. ***Learning how to do probabilistic/statistical modeling, simulation and analysis in R is a key component of this class.*** Please visit [here](#) and install R on all of your computers so that you can practice writing R code at home. *You may choose to use Matlab/Octave or any other software, but the instructor and TAs will provide help for R only.*

Course Assessment

This is not a normal semester and we aren't going to assess student performance as if it were. (See section **Pandemic Matters** below for more information.)

Rather than use exams or other “high-stakes” assessments, grades this semester will be based on more “low-stakes” assessments designed to reward regular participation/course involvement, creativity and mastery of core concepts rather than calculations.

- **Homework Quizzes:** Homework assignments will be posted to the CatCourses web site on Friday but it will not be collected. Instead, a subset of the homework problems will be chosen for a “homework quiz.” This quiz will be released to the course on Thursday morning and will be due by Friday at 11:59pm. Problems selected for homework (and homework quizzes) will be similar to those presented in the textbook, posted videos, readings and discussion section worksheets.

Your lowest 2 homework quiz scores will be dropped when computing final grades.

- **Video Quizzes:** Each week, in addition to the course lectures, we will post several short videos related to the course material.

Each Tuesday morning a video quiz will be posted that will have short comprehension questions about the course lecture or supplemental videos from the previous week. These quizzes are intended to test comprehension and will be a combination of multiple choice and short answer. These quizzes will be due Wednesday night by 11:59pm.

Your lowest 2 video quiz scores will be dropped when computing final grades.

- **Discussion Sections:** Your discussion section will involve completing worksheets and using R, a statistical programming language, to perform various tasks of interest: computation of probabilities, fitting of statistical models, visualizing data sets, etc. Every week is 15 points, 5 points are for attendance and participation and 10 points will be for the lab/activity.

Your lowest 2 lab scores will be dropped when computing your course grade.

- **Video Projects:** There will be two video projects, the purpose of the video projects is for you to demonstrate your understanding of the concepts and being able to apply them to solve problems. You will be asked to record a short oral presentation on a topic that is randomly picked from a list we provide or you may suggest your own topic (subject to approval by the Instructors), and upload it to CatCourses. The 1st video project will be due by 11:59pm, Thursday, October 15, 2020, and the 2nd video project will be due by 9:30pm, Thursday, December 17, 2020.

Please submit your videos before the deadline, late video submission will not be accepted and we will trust the CatCourses time-stamp.

Grading: The final grade will be determined by the following weights:

- 25% for homework quizzes (lowest two dropped)
- 25% for video quizzes (lowest two dropped)
- 30% for discussion sections (lowest two dropped)
- 10% for 1st video project
- 10% for 2nd video project

Extra Credit: There will be opportunities throughout the course for extra credit. Students may submit one of each category of extra credit assignment during the semester (at most two extra credit assignments per student). While other areas may be added, we will begin the semester with these two:

1. Data is Ugly!

A critical component of statistics, is visualization of data. The real world is full of examples of data presented in overly complicated, unreadable or (worse) purposely misleading ways.

You will have the opportunity to gain extra credit by submitting an *ugly* figure (ideally from a published news source or similar professional who should know better) and providing a written critique of the figure including describing a better way to present the same information!

Higher credit will be given to students who go the extra mile and create a better version of the figure themselves! (You may want to consult [Reddit](#) for suggestions but as your Professor(s) regularly monitors this site you are encouraged to look beyond.)

2. Choose Your Own Data Adventure!

One of the best parts of being a data-driven researcher is coming up with your own questions and doing the research to answer them! With over 300 students in this class, we have a pretty good sample of students. So what kinds of questions can we ask?!

For this extra credit assignment, you will submit a question (or questions) you want to pose to students in the course. This can be something like, 'how many pets do you have', 'pick a number between 1 and 400' or 'what has your favorite course been at UC Merced'? (Ideally, it's something way more interesting than these!)

For reasons of student privacy, your proposed question will be reviewed by Instructors and TAs for both suitability and creativity. If your question is selected, it will be asked to the entire course. You will be responsible for analyzing the data and reporting the results to the class in the form of a short video.

Important Dates:

Last Day to Add/Drop Courses	4:30pm, Wednesday, September 16, 2020
1st Oral Presentation Due	11:59pm, Thursday, October 15, 2020
Election Day, NO CLASS	Tuesday, November 3, 2020
Course Withdraw Deadline	Wednesday, November 4, 2020
2nd Oral Presentation Due	9:30pm, Thursday, December 17, 2020

Course Expectations

Calculus: The course is intended to be a course in probability and statistics for those who are *very comfortable* with calculus. Math 23 is a corequisite. Anyone who has any problem with prerequisite material is strongly encouraged to shore up their background *before* attempting Math 32.

Expectations: We expect you to participate in the course through lectures, discussion section participation and other engagement. *We also expect you to make use of opportunities to get help outside of class (office hours, email) if you need help.* Short, specific email messages are the most helpful.

Please note that the instructors have set up an email filter for this course and **you must put "Math 32" in your subject line.**

Tip: Find time to *do* a little bit of Math 32 every day, or as regularly as you can. Math is learned by *doing*, i.e., by actually spending your own time solving problems *and* understanding the solutions. There is no way around this.

Collaboration Policy: Discussion of homework problems is encouraged. However, when it comes time to submitting any work (quizzes, videos, etc) you should do this by yourself. If there are any questions, please ask a course instructor or TA.

Special Accommodations: Student Affairs determines accommodations based on documented disabilities. If you qualify, please submit a letter from Disability Services to the instructor; every effort will be made to accommodate your needs.

We will also make every effort to accommodate students whose religious beliefs/obligations lead to scheduling conflicts with exams, assignments, or attendance. Please speak with the instructor during the first two weeks of class regarding any potential accommodations that may arise due to religious beliefs this semester.

Inclusion and Diversity: We value all students regardless of their background, country of origin, race, religion, ethnicity, gender, sexual orientation, disability status, etc. and am committed to providing a

climate of excellence and inclusiveness within all aspects of the course. If there are aspects of your culture or identity that you would like to share with course instructors as they relate to your success in this class, we are happy to meet to discuss. Likewise, if you have any concerns in this area or facing any special issues or challenges, you are encouraged to discuss the matter with us (set up a meeting by e-mail) with an assurance of full confidentiality (only exception being mandatory reporting of academic integrity code violations or sexual harassment).¹

Pep Talk! Learning R can be difficult at first—it is like learning a new language, just like Spanish, French, or Chinese. Hadley Wickham—the chief data scientist at RStudio and the author of some amazing R packages you will be using like `ggplot2`—made this wise observation:

It's easy when you start out programming to get really frustrated and think, "Oh it's me, I'm really stupid," or, "I'm not made out to program." But, that is absolutely not the case. Everyone gets frustrated. We (Courset Instructors and TAs!) still get frustrated occasionally when writing R code. It's just a natural part of programming. So, it happens to everyone and gets less and less over time. Don't blame yourself. Just take a break, do something fun, and then come back and try again later.

If you are finding yourself taking way too long hitting your head against a wall and not understanding, take a break, talk to classmates, ask questions ... e-mail me, etc.

We *promise* you can do this.²

Pandemic Matters

Life sucks right now. None of us is really ok. **We're all just pretending.**

You most likely know people who have lost their jobs, have tested positive for COVID-19, have been hospitalized, or perhaps have even died. You all have increased (or possibly decreased) work responsibilities and increased family care responsibilities - you might be caring for extra people (young and/or old!) right now, and you are likely facing uncertain job prospects (or have been laid off!)

We're fully committed to making sure that you learn everything you were hoping to learn from this class! We will make whatever accommodations we can to help you finish your exercises, do well on your course projects, and learn and understand the class material. Under ordinary conditions, we are flexible and lenient with grading and course expectations when students face difficult challenges. Under pandemic conditions, that flexibility and leniency is intensified.

If you tell an instructor or TA that you're having trouble, we will not judge you or think less of you. We hope you will extend us the same grace.³

As a student at UC Merced, we encourage you take advantage of the resources you have at your disposal for your mental health.

- As a student, you are eligible for [Counseling Services](#).
- The [Calm](#) meditation and wellness app is available for free for any student, faculty or staff member of UC Merced.

Remember, we are all in this together.

¹This inclusion statement was written by chemistry professor Dr. Steve Zimmerman at the University of Illinois at Urbana-Champaign. Source: <https://mobile.twitter.com/steveczimmerman/status/1161019135251353606>

²This pep talk was adapted from data science instructor Andrew Heiss at Georgia State University. Source: <https://mobile.twitter.com/andrewheiss/status/1165310391750189063>

³This statement was adapted from data science instructor Andrew Heiss at Georgia State University. Source: <https://twitter.com/andrewheiss/status/1293909055795105792>