

# Welcome to Math 161a (Summer Session I)

– Summer 2021, San José State University

Prof. Guangliang Chen

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# Agenda for today

- Introductions
- Course overview
- Course policies
- Assignments from today

## Know your professor

- **Current title:** Associate Professor of Statistics
- **Education:** PhD in Applied Math, University of Minnesota, July 2009
- **Employment history:** Visiting faculty at Duke University (2009-2013) and Claremont McKenna College (2013-2014)
- **Teaching experience**
  - SJSU (2014-present): Math 42 (discrete math), 161a (x7), 39 (linear algebra I), 163 (probability theory), 164 (mathematical statistics), and various graduate-level courses
  - Previously: college algebra, calculus, differential equations, statistics

## Now it's your turn...

You can briefly introduce yourself by saying your

- **name**
- **major**
- **academic year,**
- **why you want to take this course,** and
- **anything else about you** (to help us remember who you are).

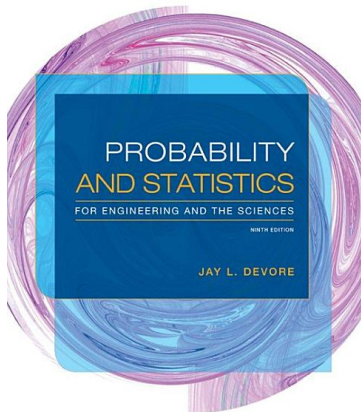
## Overview of Math 161a

- A **calculus-based** introductory course on **probability** and **statistics**.
- Students typically come from **stats, applied math, CS, and engineering**.
- **Catalog description:** Descriptive and inferential statistics. Collection and analysis of data, discrete and continuous probability models, random variables, central limit theorem, confidence intervals, hypothesis testing.
  - **Prerequisite:** MATH 31 Calc II
- This course is a prerequisite for quite a few other courses, such as Math 150, 161B, 162, 163, and 167R.

## Textbook

**Required:** *Probability and Statistics for Engineering and the Sciences*, 9th ed, Devore (2016), Cengage Learning.

- We will cover selected topics in chapters 1 – 8 of this book.
- You may use the 8th ed or older for reading but **homework will be assigned based on the 9th ed.**



## Course contents

This course can be divided into two parts:

- **Probability** (Chapters 2-5): mathematical study of **random phenomena**
- **Statistics** (Chapters 1, 6-8): use **sample** (data) to infer about population (while dealing with randomness)

We will look at one example from each part today:

- Coin-flipping
- Egg weight

## Random phenomena and probability

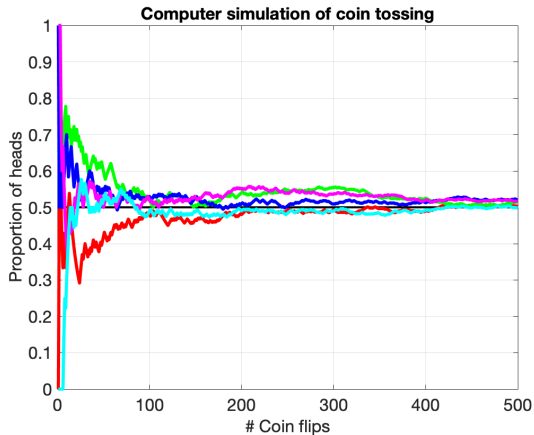
Flipping a coin is the simplest random phenomenon:

- Results of individual coin flips (called trials) are unpredictable.
- In the long run (i.e., when one tosses a coin many times), proportion of heads converges to a fixed number (probability)





# Math 161a: Course introduction and overview



## Random variables and their distributions

Let  $X$  be the number of heads that appear in 5 consecutive coin flips (experiment).

Below shows one possible outcome of the experiment:



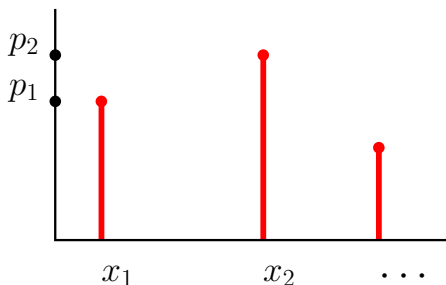
$X$  is an example of a **random variable** (a central concept in the study of probability and statistics):

*Remark.*

- The value of  $X$  is uncertain in individual replications of the experiment;
- However,  $X$  can only take values from the set  $\{0, 1, \dots, 5\}$ , called the range of  $X$ .
- Some values (e.g. 2) are more likely than others (e.g. 0). This means that different values of  $X$  may occur at different frequencies.

We can thus talk about the **distribution** of such a random variable  $X$ , which refers to the following two combined:

- *Range*: which values  $X$  can take,
- *Frequency*: how often it takes those values.



value	$x_1$	$x_2$	$\dots$
frequency	$p_1$	$p_2$	$\dots$

### **A joke about coin flipping**

A statistics major was completely hung over the day of his final exam. It was a true/false test, so he decided to flip a coin for the answers.

The statistics professor watched the student the entire two hours as he was flipping the coin ... writing the answer ... flipping the coin ... writing the answer.

At the end of the two hours, everyone else had left the final except for the one student. The professor walks up to his desk and interrupts the student, saying

“Listen, I have seen that you did not study for this statistics test, you didn't even open the exam. If you are just flipping a coin for your answer, what is taking you so long?”

The student replies bitterly (as he is still flipping the coin),

“Shhh! I am checking my answers!”

## What's next on Probability?

### Basic concepts (Chapter 2):

- Sample space, events, probability
- Counting
- Conditional probability, independence, and Bayes' Rule

### Random variables (Chapters 3-5):

- Discrete distributions
- Continuous distributions
- Joint distributions

## Math 161a: Course introduction and overview

**Example.** Suppose you buy a carton of 12 brown eggs from a grocery store, which can be thought of as a *random sample* of size 12 of the brown eggs population at the store (with a certain distribution).



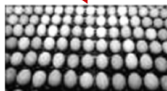
**Question.** What is the distribution of the sample mean  $\bar{x}$  (which is a random variable)?



**New question.**

You buy a carton of 12 white eggs instead. The box weighs 770g. The average egg weight from that sample is  $\bar{x} = 64.2\text{g}$ .

What can you infer about the mean weight  $\mu$  of the white eggs population?





### Inference

Three different kinds of inference questions may be asked about the mean egg weight at the store:

- **Point estimation** (Chapter 6):  
Q1: What is your **single best guess** for the average weight of the white eggs population at the store?
- **Interval estimation** (Chapter 7):  
Q2: Can you use an **interval** to (better) capture the population mean?
- **Hypothesis testing** (Chapter 8):  
Q3: Suppose the seller **claims** that the average egg weight is 65g. Should you believe it or not, based on the sample?

## Format of the course

This is an online class, delivered over Zoom<sup>1</sup>:

- The presentations are **slides-based**:
  - Pros: efficient, informative, and easily accessible
  - Cons: very fast-paced ← Reading the textbook and/or the old slides before class can be very helpful
- Accompanied by **worksheets** (containing lecture examples) for use in class
- Complemented by **office hours** on Zoom (10:35am-11:15am each weekday) and **Piazza** to answer any questions

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<sup>1</sup>The Zoom recordings will be shared with you after each class.

## Learning management system

I will use **Canvas** in various ways:

- Post homework assignments and tests
- Record homework and test scores
- Make announcements (e.g. reminders, clarifications, deadline changes)
- Post Zoom recordings and annotated slides

Make sure to check your Canvas settings to receive timely notifications. Also, check if your email address in record is still good.

## Course webpage

I am maintaining a course webpage<sup>2</sup> for posting the following information:

- Links to Zoom meeting registration, Piazza, and Zoom office hours (also available in Canvas).
- Lecture slides and other learning resources

Please visit the webpage before class to download the corresponding slides (try refreshing your browser if you don't see them).

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<sup>2</sup><https://www.sjsu.edu/faculty/guangliang.chen/math161a.html>

## Piazza

We will use **Piazza** as the class bulletin board to communicate and discuss course-related questions.

**Advantages:** Responses (from me and/or your peers) are **fast**, **efficient** and have **broad impact**. Also, you get to interact with your peers!

Sample questions you can post there (with the option of being anonymous) :

- *What is the new due date for HW3 (I couldn't go to class)?*
- *What does HW2-Q1 want, or I got 0.6 for Q2, is that correct?*
- *Can somebody explain to me in a different way what sample space is?*
- *Can somebody kindly share your notes with me (I was sick)?*

## Zoom classroom etiquette

You need a **camera** and **microphone** for attending the Zoom meetings. Please

- Arrive at each Zoom meeting on time
- Have your cameras on (when without privacy concerns)
- Keep yourself muted when you are not speaking
- Avoid inappropriate name, language, or virtual background
- Use “raise hand” or the chat box to ask or answer questions
- Refrain from distracting activities on Zoom

### Lecture recording policy

All lectures will be recorded and shared with the whole class afterwards. However, you should still make every effort to attend all classes.

If you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible alternatives.

Students are prohibited from recording class activities, distributing class recordings, or posting class recordings. Materials created by the instructor for the course are copyrighted by the instructor. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office.

## Other technology requirements

You need a **scientific calculator** for some questions on homework and tests.

You will also need access to a **scanner** (physical or cell phone app) for scanning your work on paper.

The tests will be delivered via **Proctorio**<sup>3</sup>, which requires

- A desktop computer with a camera and microphone
- The latest Google Chrome browser
- The Proctorio extension added to Chrome.

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<sup>3</sup><https://proctorio.com/support>



## Course requirements

- **Homework (15%)**: Assigned in Canvas (and you need to submit a scanned version of your work to Canvas). There are 11 assignments in total.
- **Quizzes (15%)**: Assigned for completion outside of class time at a rate of 1 to 2 quizzes each week.
- **Midterm exam (30%)**: June 18, Friday, 9-10:35am (class time)
- **Final exam (40%)**: July 2, Friday, 9-11:15am (**135 minutes long**)

## Grading policy - homework

Homework assignments, with their due dates, will be regularly posted in, and collected through, Canvas.

You may collaborate on homework but **you must write your own solution.**

**Late homework will not be accepted for any reason,** but your lowest homework score will be dropped.

## Grading policy - quizzes

There will be 1 to 2 quizzes per week, assigned via Proctorio.

Each quiz will consist of **10 multiple-choiced questions**, which are intended to test your understanding of concepts.

You will be given **20 minutes** to complete each quiz.

If you miss a quiz, you will not be able to make up for it.

Your lowest quiz score will be dropped.

## Grading policy - tests

Both the midterm and final exams will be proctored remotely via **Proctorio**.

The exams are **open book** and **open notes**, but **you are not allowed to use the internet or communicate with people in any way**.

Before each exam, a study guide with some practice problems will be provided to you; however, there is no guarantee of any level of similarity with those problems. Thus, it is in your best interest to review the material thoroughly.

**No make-up exams will be given if you miss the midterm exam**. If you have a legitimate excuse (e.g., illness or other personal emergencies) AND can provide some kind of evidence, the weight of the midterm will be combined with the final.

## Important reminders

**Show all necessary steps** for both homework and tests:

- It is your entire work (in terms of **correctness, completeness, and clarity**) that is graded.
- **Correct answers with no or poorly written supporting steps will be given very little credit.**

Please **write legibly** (unrecognizable work will receive no credit).

Copying or plagiarism at any level will not be tolerated and, per SJSU policy, will be reported to the Office of Student Conduct & Ethical Development.

## Grade cutoffs

...will be determined by combining the following **fixed percentages**:

- A+: 96%, A: 93%, A-: 90%
- B+: 86%, B: 82%, B-: 78%
- C+: 74%, C: 70%, C-: 66%
- D+: 64%, D: 62%, D-: 60%
- F: < 60%

AND **the actual distribution of the class** at the end of the summer session.

## Potential challenges

This 5-week summer session is very intensive:

- Class meets every day (for 1 hour and 35 minutes)
- There will be an homework assignment due and also a quiz or test every 2 to 3 days
- Both the midterm and final are on Fridays
- You are expected to spend 2 to 3 hours outside of class each day.

Make your effort to attend every class and focus your attention in order to learn the most out of each lecture!

### Other challenges:

- **Online classes** are still new and require extra effort and patience
- **Slides-based lectures** tend to move fast
- **A lot of material** to be covered
- **Statistical concepts** can be sometimes difficult to grasp
- You need to have **solid calculus skills** (to deal with series, integrals)
- Ability of **abstract thinking and reasoning** is also important.



## Your responsibilities in learning

My duty as an instructor is to disseminate knowledge while helping you learn. The ultimate responsibility of learning is upon the student, not the instructor.

Thus, you should

- Attend all classes
- Participate in-class discussions
- Read the textbook before and after class
- Take time to think through the concepts
- Do your homework
- **ASK whenever you don't understand something!!!**

## Class protocols

- The meetings will start on time, so be sure to arrive on time each day.
- If you miss a meeting, you are responsible for finding out what's announced in that class (such as deadline change), and acting accordingly.
- Please turn on your video during each meeting but keep yourself muted (except when you want to speak up in class).
- You may use the chat window to ask questions or “raise your hand” to speak up in class.
- **Academic dishonesty at any level is not tolerated and will be surely reported to the Office of Student Conduct, per SJSU policy.**

## Special accommodations

If you anticipate needing any special accommodation during the semester (e.g., you have a disability registered with SJSU's Accessible Education Center), please let me know as soon as possible.

## Instructor feedback

I strive to teach in the best ways to facilitate your learning. To achieve this goal, it is very helpful for me to receive timely feedback from you.

You can choose to

- **talk to me in person** (via Zoom), or
- **send me an email** at *guangliang.chen@sjsu.edu*, or,
- **submit your feedback anonymously** through <http://goo.gl/forms/f0wUD5aZSK>.

## Assignments from today

- **HW0 (algebra and calculus review)**: Due June 2, Wednesday, 5pm.
- **Proctorio get-started**: Due June 3, Thursday, 5pm. ← You will get up to 2 bonus points toward quizzes

**Questions?**