Math 32

Lecture 1: Introduction

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Introducing the Presenter

Lecturer: Derek Sollberger

Originally from Los Angeles

BA in Applied Mathematics, UC Berkeley

MS in Applied Mathematics, CSULB

MS in Applied Mathematics, UC Merced

Introducing the Presenter

Continuing Lecturer in Applied Mathematics

8+ years of teaching at UC Merced

Courses:

- Bio 18: Data Science
- Bio 175: BioStatistics
- Bio 184: Python for Bioinformatics
- Math 32: Probability and Statistics

Current research:

- Pedagogy, sports analytics

Why Probability?

The “classic” birthday problem:

How many students have to enter the Twitch stream until there are two students that share a birthday?

Deterministic vs Probabilistic

Deterministic: a situation that can be solved with equation solving and/or an algorithm

- Example: If water boils at 100 degrees Celsius, what is that threshold in Fahrenheit?

Probabilistic: a situation that cannot be completely solved due to an element of chance

- Example: What is the chance that it will rain tomorrow?

Probability and You

Applied Mathematics

- Does a probabilistic sequence converge or diverge?

Bioengineering

- What percentage of lyme disease patients would be cured with the current but experimental treatments?

Chemical Sciences

- What proportion of reactants undergo a reaction early in the reaction?

Computer Science and Engineering

- How many computers in a network would be affected after a virus infection?

Probability and You

Environmental Engineering

- How many of a certain species of plants are in the Vernal Pools Reserve?

Materials Science and Engineering

- What percentage of a semiconductor is made of impurities?

Mechanical Engineering

- For a commercial passenger airplane, what is the probability that at least two engines fail during a flight?

Physics

- How many stars are in the Milky Way?

Ugh, the syllabus

Course Description:

Concepts of probability and statistics. Conditional probability, independence, random variables, distribution functions, descriptive statistics, transformations, sampling errors, confidence intervals, least squares and maximum likelihood. Exploratory data analysis and interactive computing.

For the School of Natural Sciences

Course Learning Outcomes:

1. Develop probabilistic models of random phenomena.
2. Infer statistical models from real data.
3. Apply mathematical methods to probabilistic/statistical models to
    a. Make predictions and
    b. Quantify the uncertainty in these predictions.
4. Write and run “simple” R programs for the purposes of data analysis, modeling, and visualization.

Program Learning Outcomes

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. .

5. .

Assessment

Category	Percentage
Discussion section participation	10
Surveys	5
Written homework	25
Programming homework	25
Exam 1 (Friday, February 26)	10
Exam 2 (Friday, April 16)	10
Final Exam (Thursday, May 13)	15

Of note

Special Accommodations: University of California, Merced is committed to creating learning environments that are accessible to all. If you anticipate or experience physical or academic barriers based on a disability, please feel welcome to contact me privately so we can discuss options. In addition, please contact Student Accessibility Services (SAS) at (209) 228-6996 or disabilityservices@ucmerced.edu as soon as possible to explore reasonable accommodations. All accommodations must have prior approval from Student Accessibility Services on the basis of appropriate documentation. If you anticipate or experience barriers due to pregnancy, temporary medical condition, or injury,please feel welcome to contact me so we can discuss options. You are encouraged to contact the Dean of Students for support and resources at (209) 228-3633 or https://studentaffairs.ucmerced.edu/dean-students.

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Nerdy Example

How many numbers between zero and one do we have to add up to have a sum that is greater than one?

- Assume selection from a uniform distribution

Upcoming


Your chances of getting killed by a cow are low, but never zero