Welcome!
Agenda

- Introduction
- Warm-up
- Syllabus
- Lecture 1 : Set Theory
Introduction

• Instructor: Dr. Meimei Liu (email: meimei.liu@duke.edu)
  - Office Hours:
    - Fri: 9:50am-10:50 am, 208A, Old Chem Building; or by appointment

• TA
  - Sheng Jiang    OH: 4:00pm - 6:00 pm Tu
  - Miranda Ding  OH: 3:00pm - 5:00 pm Wed
  - Jiajun Song    OH: 3:00pm - 5:00 pm Th
  - Jose San Martin OH: 12:00pm -2:00 pm Wed
Introduction

• What you can expect from me
  - Provide you with the most important tools of statistics.
  - Engage with you; guide you in your statistical thinking.
  - Be available outside of class to talk about the course, answer questions, and advise you.
  - Return homework in a timely manner.
  - Ask for feedback (quiz) and work with you to improve the class.
Introductions

• What I expect from you
  - Arrive and leave on time, minimize disruptions.
    - NO cell phones in class.
  - Take notes with pen and paper.
    - student version of slides posted online before class.
  - http://www2.stat.duke.edu/courses/Fall19/sta611.01/
  - Be engaged in class.
  - Academic integrity.
Warm-up

• We all tend to use “statistics” in every day life:
  - “… statistically speaking…”
  - The weather forecast for tomorrow is...
  - “Text books typically cost…”
  - “The 2022 FIFA World Cup predictions…”
  - “Attendance in STA611 is correlated with class performance…”
• **What is Statistics?**
  - Statistics according to dictionary.com:
    The science that deals with the collection, classification, analysis, and interpretation of numerical facts or data, and that, by use of mathematical theories of probability, imposes order and regularity on aggregates of more or less disparate elements.

• **Statistical analysis**
  - Use probability models to describe uncertainty
  - The Goal of statistical inference: what do the data tell us?

Examples: Flip a coin 5 times : H H T H T
Question: Whether the coin is fair or not?
Warm-up

Mathematical Statistics: (from wiki)
The application of probability theory, a branch of mathematics, to statistics, as opposed to techniques for collecting statistical data.

• Statistics and Probability
Syllabus: Required text

Syllabus: Course overview
http://www2.stat.duke.edu/courses/Fall19/sta611.01/Schedule.html

• Basic probability theory, Random variables, Expectations, Probability distribution functions, convergence.

• Principles of statistical inference, Likelihood based, Frequentist and Bayesian paradigms.

• Estimation, sampling distributions and hypothesis testing.

• All class materials are distributed on-line; for example, you may view most class notes and homework assignments on the Schedule. Sakai is used to report scores from homework and exams.
Prerequisites: calculus background is required!

You need to be familiar with the following

- Function, limit, continuity
- Differentiation e.g. product rule, quotient rule and chain rule:
  
  \[
  (f(x)g(x))' = f'(x)g(x) + f(x)g'(x)
  \]
  
  \[
  \left( \frac{f(x)}{g(x)} \right)' = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}
  \]
  
  \[
  (f(g(x))) = g'(x)f'(g(x))
  \]

- Integration, integration techniques such as integration by parts and by substitution,
  
  \[
  \int f(x)g'(x)dx = f(x)g(x) - \int f'(x)g(x)dx
  \]
  
  \[
  \int_{g(a)}^{g(b)} f(x)dx = \int_{a}^{b} f(g(t))g'(t)dt
  \]

- Math quiz
  - Take this quiz by yourself, no later than by (Wed Sep 4) to help you determine if you have the necessary mathematical background.
  - The quiz will not be graded.
Syllabus:
Performance Evaluation (course total grade)

• Course total grade
  o Homework (15%)
  o Midterm (30%)
  o Class Participation (5%)
  o Final Exams (50%)

• All grades are reported on Sakai
• Homework assignments

➢ Weekly homework assignments will be posted on the online Schedule and are due each Wednesday at the beginning of class starting from the second week, unless otherwise announced in class.

➢ Late homeworks are penalized, and missed homeworks receive zero scores, but each student's lowest homework score is dropped.

➢ Homework assignments can be submitted at class time before the due time or submit through Sakai.

➢ Grades will be returned to you via Sakai.
• You may discuss and collaborate in solving homework problems, but you may not copy—each student should write up his or her solution independently. Cheating on exams, copying or plagiarizing homeworks or projects, lying about an illness or absence and other forms of academic dishonesty are a breach of trust with classmates and faculty, and will not be tolerated. They also violate Duke's Community Standard and will be referred to the Graduate School Judicial Board or the Dean of the Graduate School.
• Exams

➢ One in-class, closed-book midterm exam
➢ One closed-book cumulative final
➢ Brief in-class quizzes will be added if needed.

➢ You can bring a scientific calculator
➢ A letter sized cheat-sheet (1-sided for midterm and 2-sided for final) with anything you want written on it.
➢ No laptops, notebooks, or cellphones are allowed.

➢ Important Date:
  Midterm exam: 8:30am – 9:45am Wed, 10/02/2018
  Final exam: 7:00pm-10:00pm, 12/12/2018
Syllabus: Email & Forum (Piazza)

• Announcements will be sent by email, please make sure to check your email daily.

• Any non-personal questions related to the material covered in class, problem sets, etc. should be posted on Piazza.

• Before posting a new question please make sure to check if your question has already been answered. The TAs and myself will be answering questions on the forum and all students are expected to answer questions as well.

• Please use informative titles for your posts.

• Note that it is more efficient to answer most statistical questions "in person" so make use of OH.
Missed work and absences

• Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Student Disability Access Office at (919) 668-1267 as soon as possible to better ensure that such accommodations can be made.

• Students who miss graded work due to a scheduled varsity trip, religious holiday or short-term illness should fill out an online NOVAP, religious observance notification or short-term illness notification form respectively.

• If you are faced with a personal or family emergency or a long-range or chronic health condition that interferes with your ability to attend or complete classes, you should contact your academic dean's office. See more information on policies surrounding these conditions here, and your academic dean can provide more information as well.