1. **Instructor Information**

   **Instructor:** Prakash Balachandran, “Kash”  
   **Office:** MCS 230, 111 Cummington Street  
   **Office Phone:** 617-353-9543  
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   **Office Hours:** 4:30pm-6:00pm Mondays and Fridays (email encouraged)

2. **Teaching Fellow Information**

   **Teaching Fellow:** Xinyi Deng  
   **Office:** MCS 256, 111 Cummington Street  
   **Office Phone:** 617-353-5287  
   **E-mail:** xinyi@bu.edu  
   **Office Hours:** 11:00am-12:00pm Mondays and Wednesdays

3. **Course Information**

   **Lecture:** CAS 224, MWF 02:00 PM-03:00 PM  
   **Textbook:**

   **Class Website:** Lectures notes, handouts, and other course information will be made available on the course website.  

   **Course Objectives:** This course serves as an introduction to basic concepts and tools in statistics and probability. We begin with how to describe data. Then, we study elements of probability theory. Finally, we combine data description and probability theory into an approach known as statistical inference. Students should emerge from this course with the ability to incorporate a variety of skills in analyzing and reasoning from data.

   **Classes:** Class attendance and participation are vital. Arriving on time, being prepared for the new material, and leaving only at the end of class are absolutely necessary to get the most out of this course. Lectures have the highest priority for exam content and proper manner of presentation of solutions. There will be a discussion section held with the teaching fellow once a week to discuss the problem sets and various topics presented in lecture.

   **Prerequisites:** A good background in high school algebra.
Homework: Homework will be assigned regularly during the course and a due date will be announced. **No late homework will be accepted.** Solving the problems assigned for homework is fundamental to succeed in this class. It is imperative that you are conscientious in making sure that you understand and communicate your solutions carefully and completely. To receive full credit for your solutions to homework problems, all work must be shown. Exams will be based on homework problems. **The lowest score will be dropped if you have perfect attendance and have submitted all homework.**

Exams: There will be two in class one-hour midterms and one two-hour comprehensive final. Exams will take place according to the following schedule

- **Midterm I:** Wednesday, October 5
- **Midterm II:** Friday, November 4
- **Final:** Wednesday, December 21 (CAS 224, 3:00pm-5:00pm)

Grading Policy: Homework: 20%, Midterm I: 25%, Midterm II: 25%, Final: 30%.

Final Grade Distribution: A: 90-100, B: 76-89, C: 65-75.

Examination Policy: All exams are closed book and notes. All work must be shown to receive full credit and answers should be given exactly. **Only exceptional circumstances presented prior to the exam will be considered for possible makeups.**

Makeup Policy: Exams **cannot** be made up unless for truly exceptional and documented reasons.

Incompletes and Withdrawals: The Incomplete grade “I” is given only in exceptional cases to students who have maintained a good record through much of the course and suddenly find themselves in a difficult circumstance (illness, death in the family). Others who find out early on that they are not keeping up are urged to drop or withdraw from the course.

- Last day to drop the class without a W: Tuesday, October 11.
- Last day to drop the class with a W: Friday, November 11.

Software: A graphing calculator is recommended.

Extra Help: You are encouraged to take advantage of the office hours of the teaching fellow and myself. Feel free to make appointments outside of the scheduled times. Visit the Math Help Room (MCS B24) for free tutoring provided by math graduate students.

Academic Integrity: BU has a strict policy against cheating and plagiarism. Any form of cheating or plagiarism will not be tolerated.
Course Outline (tentative):

- **Motivation.** Introduction and overview - fundamental elements of statistics, types of data, collecting data, sampling.
  **Reading:** Chapter 1

- **Methods for summarizing and describing data:** Descriptive statistics - graphical and numerical methods; organizing and summarizing continuous and discrete data sets; numerical measures of central tendency, variability, and position; five-number summary, box-plots; bar-charts and histograms.
  **Reading:** Chapter 2

- **Probability.** Introduction to probability - events, sample spaces, and probability, the additive, complement and multiplicative rules, conditional probability. Counting techniques, combinations and permutations, random sampling. Probability distributions for discrete random variables, the binomial distribution. Probability distributions for continuous random variables, the normal distribution, normal approximation to the binomial distribution.
  **Reading:** Chapter 3

- **Sampling distributions.** Sampling distribution of the sample mean. The central limit theorem.
  **Reading:** Chapter 4

- **Statistical inference: procedures for the population mean.** One-sample statistical inferences for population mean: point estimates and confidence intervals for population mean. One-sample hypothesis testing about the population mean, $p$-values. Power and sample size determination.
  **Reading:** Chapter 5

- **Statistical inference: procedures for mean difference.** Two-sample statistical inferences concerning the mean difference: two independent populations with known variances; two independent populations with unknown variances; two dependent populations - the data are matched or paired. Power and sample size determination.
  **Reading:** Chapter 6

- **Categorical data. Statistical inference for population proportion.** One-sample statistical inferences for population proportion: point estimates, confidence intervals and hypothesis testing. Two-sample statistical inferences concerning the proportion difference. Precision, power, and sample size determination.
  **Reading:** Chapter 7

- **Review.**