Instructor: Professor Harish S. Bhat  
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Description: This is a first course in calculus-based probability. It requires a solid foundation in Calculus (I, II, III), and covers the following topics:

- combinatorial problems
- random variables
- distributions and densities
- independence
- conditional probability
- expected value and moments
- law of large numbers
- moment generating functions
- central limit theorem

The order in which we cover the topics may be different than the order above. This course is three credit hours. It serves as a QRQI course (quantitative reasoning-Math, quantitative reasoning-statistics/logic, and quantitative intensive-BS).

Learning outcomes: A student who completes Math 5010/6805 should be able to:

1. Define each of the above topics.
2. Translate real-world problems into probability models.
3. Solve pencil-and-paper problems and perform concrete calculations involving the topics in probability listed above.
4. Reason theoretically and abstractly (in theorem/proof style) using the topics in probability listed above.

Prerequisites: Solid knowledge of Calculus I, II, and III.

Lecture time and place: MW 6-7:30 in LCB 215

Office Hours: TBA

Grading: The breakdown will be: 20% quizzes, 25% midterm 1, 25% midterm 2, 30% final exam.
Midterm Exam Dates: TBA.

Math 6805: Math 6805 students will be held to a higher standard of grading than those in 5010.

Textbooks: There is no official textbook for the course. Lectures will consist of material culled from multiple sources, including but not limited to the following textbooks—if the link is not provided below, try Googling:

- *Basic Probability Theory*, Robert B. Ash, available here: [https://faculty.math.illinois.edu/~r-ash/BPT.html](https://faculty.math.illinois.edu/~r-ash/BPT.html)

Homework: Each week, I will suggest homework problems for you to do. Homework will not be collected or graded. However, Exam and Quiz questions will be very similar to assigned homework problems. Therefore, the BEST way to keep up with the pace of this course and to prepare for exams is to solve homework problems in a timely fashion. Exams aside, to learn the subject well you really need to solve as many problems as you can.

Doing math is the ONLY way to learn math.

Solutions to homework problems are sometimes available online. Do not look at a solution to a problem unless you have *tried sincerely* and *suffered* sufficiently. This is not a joke—the thought and mental energy that you put into *struggling and searching* for a solution will pay dividends and help you, even if it does not appear that way now.

Quizzes: There will be approximately one online quiz per week. Each quiz will cover material introduced after the previous quiz and/or material similar to the most recent homework problems. Except in exceptional circumstances, there will be no make-up quizzes. To accommodate unavoidable absences, your lowest three quiz grades will be dropped.

Expectations: I expect you to be in class on time, to not be on your phone/tablet/laptop doing something unrelated to the course, to both ask questions and be prepared to answer questions on the spot. I expect you to take responsibility for your own knowledge and skill level. *This means that the onus is on you to spend the required amount of time to master the material. What you get out of this class will be directly proportional to how much time, effort, and care you put into it.*