Course Information

Course staff

Professors:	Sofya Raskhodnikova, Wayne Snyder
Teaching Fellows:	Ante Bing, Wonyl Choi
Teaching Assistant:	Eren Budur
Course Assistants:	John Bolognino, Rithvik Doshi, Cassie Huang, Janavi Kasera, Jonas Raedler, Dongyue (Eleanor) Xu, Ji (Anna) Zhang, Waner Zhou

Questions and class discussion on Piazza: We will use Piazza for class discussion and course announcements. Please post all course-related questions on Piazza, rather than emailing them to us. **Top participants will get bonus points at the end of the course**. Our class page is at: `https://Piazza.com/bu/spring2022/cascs237/home`

Webpage: `http://cs-people.bu.edu/sofya/cs237/`

Prerequisites: CS 131 (Combinatoric Structures), **MA 123** (or equivalent elementary calculus class), and **CS 111** (or equivalent Python programming experience). You need to be comfortable with mathematical proofs, elementary set theory and combinatorics, elementary calculus (i.e., differentiation and integration) and programming in Python.

Lectures: TuTh 2pm-3:15pm (also 3:30pm-4:45pm).

Discussions: On Fridays, TFs/TA will run weekly discussions (interactive problem solving sessions) to help with the material. Attendance is mandatory.

Textbook: Eric Lehman, F Thomson Leighton, and Albert R Meyer. *Mathematics for Computer Science,* 2018. Available for free at: `https://cs-people.bu.edu/aene/cs237fa21/mcs.pdf`

Supplementary textbooks: H. Pishro-Nik, *Introduction to probability, statistics, and random processes,* available at `https://www.probabilitycourse.com`, Kappa Research LLC, 2014. Richard Hammack. *Book of Proof*: `http://www.people.vcu.edu/~rhammack/BookOfProof/`

TopHat: We will use Top Hat during lectures to encourage active participation. Your participation will count towards your participation grade whether your answers are correct or not, so you don't have to worry about making mistakes. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message. For instructions on how to create a Top Hat account and enroll in our Top Hat Pro course, please refer to the invitation sent to your school email address or consult Top Hat's Getting Started Guide (`https://bit.ly/31TGMlw`).

Syllabus: This course covers fundamental tools from probability necessary to study applications of randomness in computing. Randomness is used in designing efficient algorithms and has numerous applications in learning, cryptography, distributed systems, networking, data mining, data privacy, complexity theory and other areas of computer science.

The following topics and their applications will be covered: events and probability, random variables and expectation, independent events and random variables, conditional probability, expectation and variance, discrete and continuous probability distributions, Markov and Chebyshev inequalities, Chernoff/Hoeffding bounds, the balls-and-bins model.

Homework: There will be an assignment due every Thursday evening on Gradescope. Assignments will be posted on Piazza, usually one week in advance. To accommodate extenuating circumstances, your lowest homework grade will be dropped.

Homeworks will be handed in as Jupiter notebooks, including both analytical and programming problems in Python. You are strongly encouraged to type your solutions to analytical problems in LaTeX; a notebook with examples will be posted in Resources in Piazza.

You should be as clear and concise as possible in your write-up of solutions. Understandability of your answer is as desirable as correctness, because communication of technical material is an important skill. A simple, direct analysis is worth more points than a convoluted one, both because it is simpler and less prone to error and because it is easier to read and understand. Points might be subtracted for sloppy formatting or for solutions that are too long.

Optional problems: Some homework assignments will include optional problems, marked by *. Later, if you ask the instructors for a recommendation or express interest in working on a research project with them, they will definitely check how well you did on the optional problems.

Collaboration and Honesty Policy: Collaboration on homework problems, except for optional problems, is permitted. *No collaboration whatsoever is permitted on optional problems and exams.* You must read and sign Collaboration and Honesty Policy. Please keep one copy of the handout for your records.

Violations of this policy will be dealt with according to University regulations.

Exams and Grading: The grade will be calculated as follows:

Homework	weekly	30%
Midterm	Thursday, March 3, 6:30pm-8:30pm	25%
Final exam	Monday, May 9 (Wednesday, May 11), 3pm-5pm	40%
Class participation	lectures, discussions, Piazza	5%

Absence due to COVID-19 or other illness: If you would like to notify us of illness-related absence, please make a private post on Piazza for instructors only.