Math 165-03 Tufts University Fall 2020
Probability Theory Department of Mathematics
Course Information

**Course website:**
canvas.tufts.edu (official);
https://jmurphy.math.tufts.edu/Teaching/Fall2020/MATH165/ (unofficial)

**Instructor:** Prof. James M. Murphy
**Email:** jm.murphy@tufts.edu
**Office Hours**: Thursdays, 1:00-2:00pm (in person); Fridays, 9:30-10:30am (Zoom)
**Zoom PID**: 596 709 6261

**TA:** Jonathan Machado
**Email**: jonathan.machado@tufts.edu
**Office Hours:** Mondays, 11:00am–1:00pm (Zoom); Wednesdays, 9:00–11:00am (Zoom)
**Zoom PID:** 884 515 9576

**Synchronous Lectures (live over Zoom):** Tuesdays and Thursdays, 3:00-4:15pm, Zoom link: https://tufts.zoom.us/j/5967096261

**In-Person Office Hours:** In-person office hours will be held outdoors, weather permitting. For in-person office hours, meetings will be capped at 5 students, and students must email at least 2 hours in advance their intention to attend.

**Textbook:** Grinstead and Snell's Introduction to Probability, free online:
https://math.dartmouth.edu/~prob/prob/prob.pdf

**Expectations for Participation**

- All in-person students are *required* to attend all Zoom lectures; this will be checked via the Zoom call log. Morever, all in-person students are *required* to attend the professor's office hours (in person or on Zoom) at least 1 time during the semester.
- All remote students are strongly *encouraged* to attend Zoom lectures and are *required* to attend the professor's office hours (in person or on Zoom) at least 4 times during the semester.

**Students in Different Time Zones or Who Transition to Remote:** All lectures will be recorded and posted on canvas.

**Quarantine Considerations:** If you become sick or must quarantine: We really hope everybody will stay well, but if you do become sick or have to quarantine and this interferes with your class participation, please let us know and we will work out a makeup schedule for you.

**Topics:** I will aim to cover roughly Chapters 1-11 of the course textbook.

In addition to mathematics, the course will use numerical simulations to build probabilistic intuition. Students will be expected to use MATLAB to perform these experiments as part of certain homework assignments.

**Approximate Lecture Schedule (Grinstead and Snell Chapters):**

September 8: Discrete distributions (1.1, 1.2)
September 10: Discrete distributions (1.1, 1.2)
September 15: Continuous distributions (2.1, 2.2)
September 17: Continuous distributions (2.1, 2.2)
September 22: Permutations (3.1)
September 24: Combinations (3.2)
September 29: Conditional distributions (4.1, 4.2)
October 1: The Monty Hall Problem and related paradoxes (4.3)
October 6: Famous distributions: discrete (5.1)
October 8: Famous distributions: continuous uniform and exponential (5.2)
October 13: Famous distributions: Gaussian (5.2)
October 15: Expectation and variance of discrete random variables (6.1, 6.2)
October 20: Expectation and variance of discrete random variables (6.1, 6.2)
October 22: Expectation and variance of continuous random variables (6.3)
October 27: Convolutions and sums of random variables (7.1, 7.2)
October 29: Convolutions and sums of random variables (7.1, 7.2)
November 3: Chebyshev's inequality and Law of Large Numbers (8.1, 8.2)
November 5: Chebyshev's inequality and Law of Large Numbers (8.1, 8.2)
November 12: Central limit theorem: Bernoulli case (9.1)
November 17: Central limit theorem: general case (9.2, 9.3)
November 19: Generating functions (10.1. 10.2)
November 24: Generating functions (10.1. 10.2)
December 1: Markov chains: definitions and intuition (11.1, 11.2)
December 3: Markov chains: definitions and intuition (11.1, 11.2)
December 8: Markov chains: ergodicity and convergence (11.3)
December 10: Markov chains: applications (no text)

**Exams and Grading:** There will be weekly homework and two take home exams. The course grade will be computed as:

Homework: 45%
Exam 1: 25%
Exam 2: 25%
Participation: 5%

For homework, the best 10/12 homework assignments will be used in computing the final grade. Generally, homework is due at 3pm on Thursdays.

Exams will be done live on Zoom. They will be timed and closed note. They will not be during normal lecture time. They are tentatively scheduled for October 22 (7-9pm EST) and December 18 (7-9pm EST). Exam 2 is not cumulative, despite its occurrence during finals week.

The participation grade consists in lecture attendance and participation (for in-person students) and also visiting office hours attendance (for all students).

**Late Policy:** Late homework is not accepted. The policy of using only the best 10/12 assignments provides a contingency option if an assignment cannot be completed in time.

**Homework Collaboration:** Students are encouraged to collaborate on homework assignments! But, all solutions must write or type their own solutions in their own words. Copying from others verbatim (or approximately verbatim) will result in a 0 on the assignment and disciplinary action.

**Learning Objectives:**

-Basic Understanding of Higher Mathematics
-Written Communication
-Problem Solving Skills

**Student Accessibility Services**: Tufts University is committed to providing equal access and support to all our students. If you have a disability that requires accommodation, please register with the StAAR Center at the beginning of the semester. You can contact them at 617-627-4539 or staarcenter@tufts.edu.