

Math 166-02  
Statistics

Tufts University  
Department of Mathematics  
Syllabus

Spring 2023  
TR 3:00-4:15, JCC 265

**Instructor:** Prof. James M. Murphy

**Email:** [jm.murphy@tufts.edu](mailto:jm.murphy@tufts.edu)

**Office Hours:** Tuesday (2:00-3:00 PM, JCC 520F), Friday (3:00-4:30 PM, Zoom)

**Zoom Meeting ID:** 596 709 6261

**TA:** Kecheng Li

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**Office Hours:** Thursday (5:00-6:30 PM, JCC 520H), Friday (12:00-1:30 PM, JCC 520H)

**Zoom Meeting ID:** TBA

**Grader:** Matt Werenski

**Email:** [matthew.werenski@tufts.edu](mailto:matthew.werenski@tufts.edu)

**Course websites:**

(1) [canvas.tufts.edu](https://canvas.tufts.edu)

(2) <https://jmurphy.math.tufts.edu/Teaching/Spring2023/MATH166/>

**Office Hours:** Office hours will be held both in person and remotely on Zoom.

**Textbook:** Larry Wasserman's "All of Statistics", Second Edition (2005)

<https://www.stat.cmu.edu/~larry/all-of-statistics/>

**Prerequisites:** MATH 165 (required); MATH 135 (helpful); experience with MATLAB/Python/R (somewhat helpful but definitely not required)

**Expectations for Participation**

- Attendance is required at all lectures.
- Students participate in class by asking and answering questions.

**Topics:** The course will be on the mathematical aspects of statistics. Central topics include a review of probability theory, estimation, parametric inference, tests for independence, regression (linear and nonlinear), and Bayesian inference.

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

The course is proof-based, and background in probability (MATH 165) is required. Background in analysis (MATH 135) will be helpful, and to a lesser extent so will background in basic coding (e.g. scripting in MATLAB/Python/R).

**Approximate Lecture Schedule ("All of Statistics" Chapters):**

January 19: Review of Probability (1.1-1.7; 2.1-2.12)  
January 24: Review of Probability (3.1-3.6; 4.1-4.2)  
January 26: Review of Probability (5.1-5.4)  
January 31: Basics of Inference (6.1-6.2)  
February 2: Basics of Inference (6.3-6.4)  
February 7: CDF Estimation (7.1)  
February 9: Statistical Functionals (7.2)  
February 14: Method of Moments (9.1-9.2)  
February 16: Maximum Likelihood (9.3)  
February 21: Maximum Likelihood (9.4-9.6)  
February 28: Asymptotic Normality and Connections with CLT (9.7-9.9)  
March 2: Hypothesis Testing (10.1)  
March 7: Hypothesis Testing (10.2)  
March 9: Hypothesis Testing (10.3)  
March 14: Exam 1 Review  
March 16: **Exam 1**  
March 28: Hypothesis Testing (10.4)  
March 30: Hypothesis Testing (10.8)  
April 4: Tests for Independence (15.1)  
April 6: Tests for Independence (15.2)  
April 11: Linear Regression (13.1-13.2)  
April 13: Linear Regression (13.3-13.4)  
April 18: Linear Regression/ Nonparametric Regression (20.2-20.4)  
April 20: Nonparametric Regression (20.1, 20.4)  
April 25: Nonparametric Regression (20.1, 20.4)  
April 27: Bayesian Statistics (11.1, 11.2)  
May 10: **Exam 2** in JCC 160

**Exams and Grading:** There will be weekly homework and two in-class exams. The course grade will be computed as:

Homework: 20%  
Exam 1: 30/40%  
Exam 2: 30/40%  
Participation: 10%

For homework, the best 10/12 homework assignments will be used in computing the final grade. For the exams, the higher score counts for 40% and the lower for 30%. Homework is due at the start of class on Thursdays.

Exam 1 is March 16. Exam 2 is May 10 at 3:30pm and will occur in JCC 160. Exam 2 is not cumulative, despite its occurrence during finals week.

The participation grade consists in lecture attendance and participation.

**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

**Academic Support at the StAAR Center:**

The StAAR Center (formerly the Academic Resource Center and Student Accessibility Services) offers a variety of resources to all students (both undergraduate and graduate) in the Schools of Arts and Science, Engineering, the SMFA and Fletcher; services are free to all enrolled students. Students may make an appointment to work on any writing-related project or assignment, attend subject tutoring in a variety of disciplines, or meet with an academic coach to hone fundamental academic skills like time management or overcoming procrastination. Students can make an appointment for any of these services by visiting [go.tufts.edu/TutorFinder](https://students.tufts.edu/TutorFinder), or by visiting our website (<https://students.tufts.edu/taar-center>).

**Accommodations for Students with Disabilities:**

Tufts University values the diversity of our students, staff, and faculty; recognizing the important contribution each student makes to our unique community. Tufts is committed to providing equal access and support to all qualified students through the provision of reasonable accommodations so that each student may fully participate in the Tufts experience. If you have a disability that requires reasonable accommodations, please contact the StAAR Center (formerly Student Accessibility Services) at [StaarCenter@tufts.edu](mailto:StaarCenter@tufts.edu) or 617-627-4539 to make an appointment with an accessibility representative to determine appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.