MATH 3670 (N) Probability and Statistics with Applications

Fall 2026 Syllabus

Contact Information

Instructor: **Dr. Ikenna Nometa**

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Course Information

Lecture Time: TR 03:30 PM - 04:45 PM

Delivery Method: In-person lectures

Location: Skiles 249

Course Prerequisite: MATH 2401 or MATH 24X1 or MATH 2411 or MATH 2551 or MATH 2561 or MATH 2550 or MATH 2X51 or MATH 2605.

Textbook: Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 6th edition, Elsevier

This book is available online for free for Georgia Tech faculty, students, and staff. You may have to use your Georgia Tech login credentials to access the book here.

[Introduction to Probability and Statistics for Engineers and Scientists (Free for GT Users)](https://www.sciencedirect.com/book/9780128243466/introduction-to-probability-and-statistics)

Course Description: This is a **fast-paced** introductory course on basic concepts and techniques in probability and statistics. The following topics from the course catalog will be covered: basic definitions, counting techniques, conditional probability, expected value, continuous random variables, multivariate distributions, the central limit theorem, maximum likelihood, optimal and unbiased estimators, confidence intervals, hypothesis testing, regression, ANOVA, and goodness-of-fit tests

Communication

I will frequently make announcements throughout the semester. You are responsible for any announcements or materials posted on Canvas (canvas.gatech.edu). Students are encouraged to install the Canvas app on their phones and keep notifications turned on. When you email me, please include [Math 3670] in the subject line. You are expected to ask general questions and interact with fellow students on the course **Piazza** platform.

Gradescope

We will use Gradescope to manage assignments/assessments. Feedback on your submitted work will also be made available to you over Gradescope. **Remember to map your answers to pages when submitting a PDF**. You are encouraged to download the mobile app and familiarize yourself with uploading handwritten material. More information can be found in the [Gradescope Submission Guide](https://gradescope-static-assets.s3-us-west-2.amazonaws.com/help/submitting_hw_guide.pdf).

Attendance

Students who miss class meetings are responsible for any assignments or announcements made during missed lectures.

Grading Policy

Your final grade is a weighted sum of your grades on homework, three midterms, and the final.

$G = 0.16 \times \text{HW} + 0.51 \times \text{M} + 0.33 \times F + E$

Here is a breakdown of the grading components:

• G: Your total grade for the course

• HW: Homework assignments

• M: Midterm grades (average of three midterms)

• F: Final exam grade

• E: Extra credit (up to 4% of your total grade)

An incomplete (an 'I') is assigned when a student was doing satisfactory work but was unable to meet the full requirements of the course for nonacademic reasons beyond their control and deemed acceptable by the instructor. If the student's performance is so poor as to preclude a passing grade, the instructor shall assign an F.

A regrade request should be made in writing within 72 hours of the exams being returned to students. Note that when turning in a regrade request, your entire assessment will be subject to regrade, not just a single problem. In addition, a regrade request can result in points being deducted from or added to your assessment.

The usual ten-point scale will be used for letter grades:
A: [90, 100], **B**: [80, 90), **C**: [70, 80), **D**: [60, 70), **F**: [0, 60).

Homework

You are strongly encouraged to complete the homework exercises, as they will prepare you for midterms. Problems on these assessments will be comparable in difficulty and rigor to those on homework. Your lowest homework will be dropped from the final grade calculation.

Weekly homework assignments will be posted on Gradescope, and students are to submit their responses electronically. For each assignment, a subset of problems will be graded. There may be supplemental problems in each assignment, which students are encouraged to work out as well.

The homework submission deadline is 11:59 pm on the due dates and is strict. **Late homework will not be accepted for any reason.**

You are encouraged to work together on the homework assignments. You should, however, make sure that you understand and can reproduce any work that you turn in. If you do so, please list the names of all collaborators in your group.

Exams

There will be 3 midterm exams and a final. All midterm exams will be given in lectures. The final exam is comprehensive, and it will be given on **Dec. 15, 2026**. Exam dates will be (tentatively):

Midterm 1	Midterm 2	Midterm 3	Final
Sept. 17	**Oct. 15**	**Nov. 12**	**Dec. 15**

No makeup exams will be given. There may be exceptions for Georgia Tech-sponsored events, documented illness, or circumstances outside of your control that prevent you from taking the exams. Please get in touch with me **at least 48 hours** in advance, with relevant documentation from the Dean of Students, if such circumstances arise before the exam dates. Note that travel is not an acceptable reason to miss an exam.

Optional Project:

An optional project is included in this course. The project will provide an opportunity to apply probability and statistics concepts to real-world data or problems. Further information about the project, including guidelines, deadlines, and evaluation criteria, will be provided early in the semester. Points earned for doing the project will count towards cumulative extra credit.

Extra Credit Policy:

Extra credit can be earned through designated activities, such as an extra credit problem in the midterms or participation in certain class events or doing a project. The extra credit added to the cumulative grade at the end of the semester may not exceed 4% of your total grade. Details are as follows:

1. **Midterm Exams**: There will be an optional extra credit problem included in each midterm exam. The points a student earns from solving an extra credit problem will be added to their total score on that midterm exam, not exceeding 100% on that exam.
2. **In-Class PointSolutions Quiz**: There will be occasional in-class pop quizzes given throughout the semester via the PointSolutions platform. Participating in these quizzes is optional. Any points earned on these quizzes will count towards a student's cumulative extra credit score (E), not to exceed 4% of the total grade.
3. **Optional Project**: Points earned for doing the optional project for the course will count towards a student's cumulative extra credit score (E), not to exceed 4% of the total grade.
4. **End of Semester CIOS**: If the completion rate for an entire class is above 85% by the day after the final exam, a 2% bonus will be added to each student's Final Exam score, not to exceed a perfect score of 100%.

Virtual Suggestion/Feedback Form (https://forms.cloud.microsoft/r/8P4vAmzw2y)

This form provides a completely anonymous space for students enrolled in the course to share feedback, suggestions, raise concerns, or submit complaints regarding the course at any point throughout the semester.

- **Purpose:** To gather honest student input on lectures, assignments, pacing, exams, course materials, or overall class experience.
- **Availability:** Open for submissions anytime during the term—feel free to submit feedback as often as needed.
- **Anonymity:** Submissions are not tied to names, email addresses, or student IDs to ensure privacy and candid responses.
- **Goal:** To identify areas for improvement and continuously enhance the learning experience throughout the semester.

End of Semester CIOS Survey

Please take a few moments towards the end of the semester to complete the CIOS survey. CIOS survey results have informed many improvements to this course in recent years, and your results will help the School of Mathematics decide how to allocate resources to this course and what directions we should take in the near future. Your instructors also use CIOS data to help improve their teaching from course to course.
To encourage students to complete the CIOS survey, if the completion rate for an entire class is above 85% by the day after the final exam, a 2% bonus will be added to each student's **Final Exam score**, not to exceed a perfect score of 100%.
Please do not ask for updates on the CIOS completion rate on Piazza: students should be using Piazza at that point in the semester to prepare for final exams.
More information about the CIOS is available at:
https://academiceffectiveness.gatech.edu/surveys/cios/about-cios

Learning Accommodations

If you need classroom or testing accommodations, please make an appointment with the ODS to discuss the appropriate procedures. More information is available on the [Office of Disability Services website](https://disabilityservices.gatech.edu). Please also make an appointment with me to discuss your accommodation, if necessary.

Honor Code

It is expected that all students are aware of their individual responsibilities under the [Georgia Tech Academic Honor Code](https://policylibrary.gatech.edu/student-life/academic-honor-code). Any violations must be reported to the Dean of Students. Cheating includes, but is not limited to, the following:

- Using an unapproved calculator, books, or any form of notes on tests.
- Copying directly from any source, including friends, classmates, tutors, Internet sources (including Wolfram Alpha), or a solutions manual.
- Allowing another person to copy your work.

- Taking a midterm or quiz using someone else's name or having someone else take a test or quiz in your name.
- Asking for a regrade of a paper that has been altered from its original form.
- Using someone else's name to gain participation points for them, or to take quizzes or tests for them, or asking someone else to use your identity for any graded or participation submission.

Statement of Intent for Inclusivity

As a member of the Georgia Tech community, your instructor is committed to creating a learning environment in which all of their students feel safe and included. Because we are individuals with varying needs, your instructor is reliant on your feedback to achieve this goal.

To that end, I (your instructor) invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community.

Additional Resources

- Drop-In Tutoring/MathLab: https://tutoring.gatech.edu/drop-in/
- Center for Academic Success: https://www.success.gatech.edu/
- Academic Advising: https://advising.gatech.edu/
- The Office of the Dean of Students: https://studentlife.gatech.edu/
- Counseling Center: http://counseling.gatech.edu
- Students' Temporary Assistance and Resources (STAR): https://studentlife.gatech.edu/content/starservices
- Stamps Health Services: https://health.gatech.edu
- Women's Resource Center: http://www.womenscenter.gatech.edu
- LGBTQIA+ Resource Center: http://lgbtqia.gatech.edu
- Veteran's Resource Center: http://veterans.gatech.edu
- Georgia Tech Police: https://police.gatech.edu

Tentative Course Outline

See below. This can also be found at the [official MATH 3670 course outline](https://math.gatech.edu/courses/math/3670).

Tentative Course Outline

Section references are to Introduction to Probability and Statistics for Engineers and Scientists (2021) by S. Ross

I. Probability Basics *Textbook: Ch. 3*

I.1 Introduction *Textbook: §3.1*

- I.1.1 Origin of Uncertainty *Textbook: §3.1*
- I.1.2 Probability versus Statistics *Textbook: §1.3*

I.2 Basic Definitions *Textbook: §3.2*

I.3 Sets and Set Operations *Textbook: §3.3*

I.4 Axiomatic Definition of Probability *Textbook: §3.4*

- I.4.1 A Special Case: The Simple Sample Space *Textbook: §3.5*

I.5 Counting Techniques *Textbook: §3.5*

- I.5.1 Permutations *Textbook: §3.5*
- I.5.2 Combinations *Textbook: §3.5*

I.6 Conditional Probability *Textbook: §3.6*

- I.6.1 Probability of Event Intersections *Textbook: §3.6*
- I.6.2 Independence of Events *Textbook: §3.8*

I.7 Bayes' Theorem *Textbook: §3.7*

II. Random Variables *Textbook: Ch. 4–5*

II.1 Introduction and Basic Definitions *Textbook: §4.1, §4.2*

II.2 The Probability Mass Function of Discrete Random Variables *Textbook: §4.1, §4.2*

II.3 The Cumulative Distribution Function *Textbook: §4.1, §4.2*

II.4 The Probability Density Function of Continuous Random Variables *Textbook: §4.1, §4.2*

II.5 Expectation and Variance of a Random Variable *Textbook: §4.4, §4.5, §4.6*

- II.5.1 Expectation *Textbook: §4.4*
- II.5.2 Median *Textbook: not covered in text*
- II.5.3 Variance and Standard Deviation *Textbook: §4.6*
- II.5.4 Moments of a Random Variable *Textbook: §4.8*

II.6 Common Discrete Random Variables *Textbook: §5.1–5.3*

II.6.1 Bernoulli Distribution

II.6.2 Binomial Distribution

II.6.3 Geometric Distribution

II.6.4 Poisson Distribution

II.7 Common Continuous Random Variables *Textbook: §5.4–5.8*

II.7.1 Uniform Distribution *Textbook: §5.4*

II.7.2 Exponential Distribution *Textbook: §5.6*

II.7.3 The Normal (or Gaussian) Distribution *Textbook: §5.5*

II.7.4 Relatives of the Normal Distribution *Textbook: §5.8*

II.7.4.1 The Chi-Square Distribution *Textbook: §5.8.1*

II.7.4.2 The t-Distribution *Textbook: §5.8.2*

II.7.4.3 The F-Distribution *Textbook: §5.8.3*

III. Pairs of Random Variables and Combinations of Random Variables

Textbook: §4.3, §4.5, §4.7, Ch. 6

III.1 Pairs of Random Variables *Textbook: §4.3*

III.1.1 Discrete Case *Textbook: §4.3*

III.1.2 Continuous Case *Textbook: §4.3*

III.1.3 Independence of Two Random Variables *Textbook: §4.3.1*

III.1.4 Covariance and Correlation Coefficient *Textbook: §4.7*

III.2 Linear Combinations of Random Variables and the Central Limit Theorem

Textbook: §4.5, Ch. 6

III.2.1 Linear Function of a Single Random Variable *Textbook: §4.5*

III.2.2 Linear Combination of Random Variables *Textbook: §4.5.1, §6.2*

III.2.3 The Central Limit Theorem *Textbook: §6.3*

IV. Statistics *Textbook: Ch. 1–2, 7–8*

IV.1 Introduction *Textbook: Ch. 1*

IV.2 Descriptive Statistics *Textbook: Ch. 2*

IV.2.1 Data Grouping *Textbook: §2.2.3*

IV.2.2 Charts *Textbook: §2.2.1, §2.2.2*

IV.2.3 Sample Statistics *Textbook: §2.3*

IV.3 Point Estimation *Textbook: Ch. 7*

IV.4 Confidence Intervals *Textbook: §7.3–7.4*

IV.5 Hypothesis Testing *Textbook: Ch. 8*

V. Regression *Textbook: Ch. 9*

V.1 Introduction *Textbook: §9.1*

V.2 Simple Linear Regression *Textbook: §9.2–9.3*

V.3 Statistical Inferences About the Regression Parameters *Textbook: §9.4*

V.4 Extensions of the Linear Model (optional) *Textbook: §9.7–9.9*

V.5 Multiple Linear Regression (optional) *Textbook: §9.10*

V.5.1 Predicting Future Responses *Textbook: §9.10.1*

V.5.2 Dummy Variables for Categorical Data *Textbook: §9.10.2*

V.6 Logistic Regression Models for Binary Output Data (optional) *Textbook: §9.11*

VI. Analysis of Variance *Textbook: Ch. 10*

VI.1 Introduction and Overview *Textbook: §10.1, §10.2*

VI.2 One-Way Analysis of Variance *Textbook: §10.3*

VI.3 Two-Factor Analysis of Variance *Textbook: §10.4–10.5*

VI.4 Two-Way Analysis of Variance with Interaction (optional) *Textbook: §10.6*

VII. Goodness of Fit Tests and Cat. Data Analysis *Textbook: Ch. 11*

VII.1 Introduction *Textbook: §11.1*

VII.2 Goodness of Fit Tests for Discrete Data *Textbook: §11.2–11.3*

VII.3 Tests of Independence in Contingency Tables *Textbook: §11.4*

VII.3.1 Contingency Tables with Fixed Marginal Totals *Textbook: §11.5*

VII.4 The Kolmogorov–Smirnov Goodness of Fit Test for Continuous Data (optional) *Textbook: §11.6*

NB: Sections colored red may be skipped during lectures. Any sections of the textbook skipped in lectures will not appear in any exam.

* This syllabus is subject to change with a 24-hour notice over Canvas and in-class announcement. *