

STAT 4157.10

Introduction to Mathematical Statistics I

Syllabus

Spring 2026

Instructor: Dr. Subrata Kundu

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Phone: 202-994-6355

Meeting Time: MW 2:20p - 3:35p

Location: GOV 104

Office Hours: M 12:00 noon - 1 p (Rome 750)
and W 1p - 2p (By Appointment only)

TA: Mr. Zexin Ren (zxren10@gwu.edu)

Note: This syllabus is subject to change based on the needs of the class.

Instructor Response Time

I will respond to emails by the end of the next business day. I will return assignments within ten days.

Course Description

This course will cover some essential concepts and tools in Probability Theory and Sampling Distribution. Topics include basic rules of probability, conditional probability, independence, Bayes Theorem, random variables, probability distributions, expectation and functions of random variables.

Course Objectives

As results of completing this course, students will be able to:

1. Explain and apply basic concepts and tools in probability theory.
2. Solve practical probability problems.
3. Derive properties of different probability distributions
4. Derive Sampling distributions and apply Central Limit Theorem

Prerequisites

Academic

- Calculus II (Math 1232) and Intro Statistics (STAT 1053 or equivalent).

Technological

As a learner in this course you need to ensure you have the required technology and skills to fully participate. Please consult the [GW Online website](#) for further information.

You should be able to:

- Use a personal computer and its peripherals.
- Download and install any software needed for the course.
- Access your GW email for university-related communications (see [Office of the Registrar website](#)).
- Use word processing and other productivity software to submit assignments.
- Use web conferencing tools to collaborate with other course participants.
- Use your computer to upload documents, recordings, and images.
- Seek technology help by contacting [GW Information Technology](#) (202-994-4948) or ithelp@gwu.edu.

Textbooks & Materials

- Textbook: Mathematical Statistics with Applications (7th edition) by D.D. Wackerly, W. Mendenhall III, and R.L. Scheaffer.

Methods of Instruction and Assessment

This course uses the following methods of instruction and assessment. Their overarching purpose is to provide opportunities for active learning and skills development, which will support you in achieving course objectives.

Methods of Instruction

- **Direct Lectures:** Weekly lecture (75 minutes each) on Mondays and Wednesdays. These lectures are designed to introduce key ideas, themes, and concerns.
- **Readings:** Each week you will be responsible for various reading assignments.

Methods of Assessment

The following assessments are indicators of your progress in the course and are intended to help you achieve course objectives.

- Homework: Homeworks will be assigned almost every week. These will be graded. You are expected to do the homework problems.
- Participation & Quizzes: All quizzes will be closed book (unless otherwise mentioned). Quizzes may cover material discussed in the same lecture. Learners will get approximately 10-15 minutes for each quiz. Some of these quizzes will be unannounced. No make-up quizzes will be given, and learners will receive zero points for any missed quiz, for any reason. Students are allowed to miss two quizzes.
- Midterms: One proctored in class closed book midterm exams will be given.
- Final Exam: An in person final exam will be given on the scheduled day. The closed book final exam will be cumulative.

The score you get in relation to the rest of the class will determine your final grade.

Grading

This course uses the following grading schema.

Assignment Type	Point Value Per Assignment	Number of Assignments	Total Percent of Final Grade
Homework	varies ²	~ 10	25%
Quizzes & Participation	20	~ 9	20%
Midterm Exam	60	1	25%
Final Exam	100	1	30%
Total			100%

²Point values will vary depending on content covered

The grading scale below determines your final letter grade.

- 93+ – 100 = A
- 90+ – 92 = A-
- 87+ – 89 = B+
- 83+ – 86 = B
- 80+ – 82 = B-
- 77+ – 79 = C+
- 73+ – 76 = C
- 70+ – 72 = C-
- 67+ – 69 = D+
- 63+ – 66 = D
- 60+ – 62 = D-
- Less than 60 = F

Credit Hour Policy

Over these 15 weeks, you will spend 2.5 hours per week classroom lectures (37.5 hours for the semester). Homework and other independent work (e.g. readings, homework, exams, project) is estimated at around 5 hours per week (75 hours for the semester) and includes one Midterm exam.

Lecture Recordings:

This is not a remote learning course. Students are expected to be present in class. However, efforts will be made to record the lectures and share the course material on Blackboard. By taking this course you agree not to share the recordings with anyone and give consent to the class recordings.

Overview & Tentative Weekly Schedule

We plan to cover the following topics. Some of the topics could be skipped.

A. Introduction: Week 1

1. Introduction to Statistics
2. What is probability; Why do we need probability?
3. Counting rules, Combinatorial Probability

B. Counting Rules & Basic Probability: Weeks 2 – 3

1. More counting rules, Probability laws
2. Conditional Probability, Independence
3. Bayes' rule

C. Univariate Discrete Probability Distributions: Weeks 4 - 5

1. Basic definition of a distribution, PMF, CDF, Examples, Expected Value, Variance
2. Bernoulli, Binomial, Hypergeometric
3. Geometric, Poisson
4. Moments, Moment Generating Functions

D. Univariate Continuous Probability Distributions: Weeks 6 - 8

1. Continuous RV, CDF, PDF, Expected Value
2. Uniform, Normal
3. Exponential, Gamma, Beta
4. MGF

E. Midterm: March 18th

F. Multivariate Distributions: Week 9 - 12

1. Joint distributions
2. Marginal and conditional distributions, Independence
3. Expected value and variance of linear functions (one lecture)

F. Functions of Random variables & Sampling Distribution: Week 13 - 15

1. Distribution of Functions of Random Variable (two lectures)
2. Method of MGF, Jacobian etc. (two lectures)
3. Order Statistics (one lecture)
4. Sampling Distribution and CLT (Time permitting)

Academic Integrity

This course will comply with [the University's Code of Student Conduct](#). The Code of Academic Integrity defines academic dishonesty as "cheating of any kind, including misrepresenting one's work, taking credit for work of others without crediting them and without appropriate authorization, and the fabrication of information." Common examples of academic dishonesty include cheating, fabrication, plagiarism, falsification, forgery of University academic documents, and facilitating academic dishonesty by others. Consult GW's [Academic Dishonesty Prevention resource](#) for further information and support.

Late Work

Late submission of coursework will NOT be accepted. Under extenuating circumstances you can obtain prior approval for extension. If coursework is missed, you will receive zero credit for that part of the grade. No make-up exams will be given. In exceptional circumstances (e.g. well-documented medical problems), a missed midterm exam will not be counted when computing your course grade.

Incomplete Grades

Undergraduate students

Incomplete grades may be given to undergraduate students only if for reasons beyond the student's control (such as medical or family emergency) s/he is unable to complete the final work of the course. Faculty should not assign an Incomplete grade if not asked by the student. [A contract](#) must be signed by the instructor and the student and filed in the department office. A copy should be submitted to the Academic Advising office in Phillips 107. A student has up to a calendar year to finish the coursework for the class, and when completed a grade change form must be submitted to the Academic Advising office to update the grade.

For further policy and contract information for undergraduate students, please consult with your advisor and also visit the website for [Columbian College of Arts and Sciences Academic Advising](#).

Policies

The following are university- and course-related policies that all course participants should read and understand. Please contact me if you have any questions.

Use of AI/ChatGPT

AI tools are prohibited for all graded assignments, quizzes and exams. All submitted work must be the student's original creation.

University policies

The following are university- and course-related policies that all course participants should read and understand. Please contact me if you have any questions.

Inclement Weather: Please note that we may hold the class online when the University is closed for inclement weather.

Academic Integrity Code

Academic integrity is an essential part of the educational process, and all members of the GW community take these matters very seriously. As the instructor of record for this course, my role is to provide clear expectations and uphold them in all assessments. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and otherwise violate the Code of Academic Integrity. If you have any questions about whether particular academic practices or resources are permitted, you should ask me for clarification. If you are reported for an academic integrity violation, you should contact "Conflict Education & Student Accountability (CESA)" to learn more about your rights and options in the process. Consequences can range from failure of assignment to expulsion from the University and may include a transcript notation. For more information, email cesa@gwu.edu, or call 202-994-6757 or refer to the Conflict Education & Student Accountability website at <https://students.gwu.edu/cesa>.

University policy on observance of religious holidays

Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three

weeks of class, the student must inform faculty in the first week of the semester. For details and policy, see provost.gwu.edu/policies-procedures-and-guidelines.

Use of Electronic Course Materials and Class Recordings

Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Unauthorized downloading, distributing, or sharing of any part of a recorded lecture or course materials, as well as using provided information for purposes other than the student's own learning may be deemed a violation of GW's Student Conduct Code.

Acceptable Use Policy for Computing Systems and Services

All members of the George Washington University must read and comply with the [Acceptable Use Policy](#) when accessing and using computing systems and services, including email and Blackboard. Please read the [Acceptable Use Policy](#) to familiarize yourself with how GW systems are to be used ethically.

Use of Student Work (FERPA)

Personal Information

GW complies with FERPA. As such, student personal information from this course will not be disclosed. For more information on FERPA, please consult the GW Office of the Registrar.

Copyright Policy Statement

Copyright Restriction: Materials used in connection with this course may be subject to copyright protection under Title 17 of the United States Code. Under certain Fair Use circumstances specified by law, copies may be made for private study, scholarship, or research. Electronic copies should not be shared with unauthorized users. If a user fails to comply with Fair Use restrictions, he/she may be liable for copyright infringement. For more information, see the [GW Copyright Policy](#) and [Fair Use guidelines](#).

Title IX Statement:

The George Washington University (GW) and its faculty are committed to creating a safe and open

learning environment for all students. If you or someone you know has experienced sexual harassment, including sexual assault, dating or domestic violence, and stalking, please know that help and support are available. GW strongly encourages all members of the community to take action, seek support, and report incidents of sexual harassment to the Title IX Office. You may contact them at 202-994-7434 or at titleix@gwu.edu or learn more by visiting <http://titleix.gwu.edu>.

Academic Support

Academic Commons

Academic Commons is the central location for academic support resources for GW students. To schedule a peer tutoring session for a variety of courses visit go.gwu.edu/tutoring. Visit academiccommons.gwu.edu for study skills tips, finding help with research, and connecting with other campus resources. For questions email academiccommons@gwu.edu.

GW Writing Center

GW Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online at gwu.mywconline.com

Support for students in and outside the classroom

Disability Support Services and Accessibility

Any student who may need an accommodation based on the impact of a disability should contact the [Office of Disability Support Services](#) (DSS) to inquire about the documentation necessary to establish eligibility, and to coordinate a plan of reasonable and appropriate accommodations. DSS is located in Rome Hall, Suite 102. For additional information, please call DSS at 202-994-8250, or consult <https://disabilitysupport.gwu.edu>.

For information about how the course technology is accessible to all learners, see the following resources:

- [Blackboard accessibility policy](#)
- [Kaltura \(video platform\) accessibility policy](#)
- [Microsoft Office accessibility policy](#)
- [Adobe accessibility policy](#)
- YouTube accessibility policy - please consult the [accessibility information site for the Google Suite of products](#).

Student Health Center 202-994-5300, 24/7

The Student Health Center (SHC) offers medical, counseling/psychological, and psychiatric services to GW students. More information about the SHC is available at healthcenter.gwu.edu. Students experiencing a medical or mental health emergency on campus should contact GW Emergency Services at 202-994-6111, or off campus at 911.

Counseling and Psychological Services 202-994-5300

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. healthcenter.gwu.edu/counseling-and-psychological-services

GW Campus Emergency Information

GW Emergency Services: 202-994-6111. For situation-specific instructions, refer to GW's Emergency Procedures guide.

GW Alert

GW Alert is an emergency notification system that sends alerts to the GW community. GW requests students, faculty, and staff maintain current contact information by logging on to alert.gwu.edu. Alerts are sent via email, text, social media, and other means, including the Guardian app. The Guardian app is a safety app that allows you to communicate quickly with GW Emergency Services, 911, and other resources. Learn more at safety.gwu.edu.

Alert DC

Alert DC provides free notification by e-mail or text message during an emergency. Visit [GW Campus Advisories](#) for a link and instructions on how to sign up for alerts pertaining to GW. If you receive an Alert DC notification during class, you are encouraged to share the information immediately.

Additional Information

Additional information about emergency preparedness and response at GW or the University's operating status can be found on [GW Campus Advisories](#) or by calling the GW Information Line at 202-994-5050.

Protective Actions

GW prescribes four protective actions that can be issued by university officials depending on the type of emergency. All GW community members are expected to follow directions according to the specified protective

action. The protective actions are Shelter, Evacuate, Secure, and Lockdown (details below). Learn more at safety.gwu.edu/gw-standard-emergency-statuses.

Shelter

- Protection from a specific hazard
- The hazard could be a tornado, earthquake, hazardous material spill, or other environmental emergency.
- Specific safety guidance will be shared on a case-by-case basis.

Action:

- Follow safety guidance for the hazard.

Evacuate

- Need to move people from one location to another.
- Students and staff should be prepared to follow specific instructions given by first responders and University officials.

Action:

- Evacuate to a designated location.
- Leave belongings behind.
- Follow additional instructions from first responders.

Secure:

- Threat or hazard outside of buildings or around campus.
- Increased security, secured building perimeter, increased situational awareness, and restricted access to entry doors.

Action:

- Go inside and stay inside.
- Activities inside may continue.

Lockdown

- Threat or hazard with the potential to impact individuals inside buildings.
- Room-based protocol that requires locking interior doors, turning off lights, and staying out of sight of corridor windows.

Action:

- Locks, lights, out of sight
- Consider Run, Hide, Fight

Classroom Emergency Lockdown Buttons

Some classrooms have been equipped with classroom emergency lockdown buttons. If the button is pushed, GWorld Card access to the room will be disabled, and GW Dispatch will be alerted. The door must be manually closed if it is not closed when the button is pushed.

Anyone in the classroom will be able to exit, but no one will be able to get in.