

MA581 Syllabus (2026 Fall, Boston University)

★ *This syllabus is the first thing you need to read and understand.* Starting from Lecture 1, we will assume that you have read the syllabus and agree with the policies stated here.

★★ For students who enroll into this course after September 2, 2026, please get in touch with me ASAP; for example, if you enroll into MA581 around Sept. 30 [HW2 due date] and you do not ask for HW1-2 extensions by email and/or in person, *your HW1-2 grades will be zero.*

★★★ You need to bring a pen/pencil to class for taking notes and/or **doing the quizzes on papers.**

● **Instructor = Guangqu Zheng** (665 Commonwealth ave, CDS429, gzheng90@bu.edu)

Classes on MoWe 12:20PM–1:35PM; 765 Commonwealth Ave **LAW AUD**

Discussion session: check your own schedule.

Office hours: MoWe 1:45–3:00PM at CDS 429; email me for additional time slots.

Textbook: (recommended) “Introduction to Probability” by Anderson, Seppalainen, and Valkó.

● **TF for the class:** XXX, Office hours: XXX in CDS XXX

★ **Undergraduate Prerequisites:** (CASMA 225 or CASMA 230 or CDS429)

★ **Graduate Prerequisites:** (CASMA225 OR CASMA230)

★ **Course description:** Basic probability, conditional probability, independence.

Random variables, approximation of the binomial distribution.

Functions of random variables and transformations.

Jointly distribution of random variables, conditional distributions.

Sums of independent random variables

Expectation and variance in the multivariate setting.

Law of large numbers and Central limit theorem.

Tails bounds and conditional distributions.

Cannot be taken for credit in addition to CASMA 381.

(Central Limit Theorem)

$$\frac{\sum_{i=1}^n X_i - n\mu}{\sqrt{n} \sigma} \Rightarrow N(0,1)$$

as $n \rightarrow \infty$

(Independence)

$$P(A \cap B) = P(A)P(B)$$

(Fourth moment of standard normal)

$$Z \sim N(0,1)$$

$$E[Z^4] = \int_{-\infty}^{\infty} z^4 \frac{1}{\sqrt{2\pi}} e^{-z^2/2} dz$$
$$= 3$$

(Conditional expectation

given a r.v. with finitely many values)

Let Y take values y_1, \dots, y_k with $P(Y = y_j) > 0$.

$$E[X | Y] = \sum_{j=1}^k E[X | Y = y_j] \mathbf{1}_{\{Y=y_j\}}$$



- **Everything that is related to your final letter grade:** (total numerical scores = 110)

- (1) 10 Homework assignments (**10 pt**)
- (2) 5 in-class quizzes [5min for 1 problem] (**20pt**) [**closed book, no calculator, no GenAI.**]
- (3) 2 mid-term (**20 pt each**) on Oct. 14, Nov.11, [**closed book, no calculator, no GenAI.**]
- (4) Final exam (**40 pt**) to assess all material [**closed book, no calculator, no GenAI.**]

Grade	Score Range	Grade	Score Range
<i>A</i>	95–110	<i>C+</i>	75–78
<i>A–</i>	91–94	<i>C</i>	71–74
<i>B+</i>	87–90	<i>C–</i>	67–70
<i>B</i>	83–86	<i>D</i>	60–66
<i>B–</i>	79–82	<i>F</i>	< 60

- **About Homework assignment and more:**

(i) There will be likely 10 homeworks, both theoretical and more of applied flavor. HW assignment shall be submitted on gradescope,¹ deadline = 5pm on the date specified on the schedule on last page of this syllabus. Each HW will be marked by completion (i.e., if you complete HW1 and have shown your effort in working out the problems, you will get 100% of the points). **TF will go through the past HWs and relevant questions in discussion sessions; make sure to attend your session.**

*** **Use of GenAI. on HW problems:** GenAI. could be a good tutor helping you solve the HW problems, while you shall not rely on it too much as it could not do the quizzes for you, it could not help you at all in mid-terms and final exam.

(ii) **HW extension policy:** Suppose the deadline is day n . If you ask for HW extension on day $n - 1$, you need to show that you have completed **80%** of the HW and you will get 2 more days after the deadline; if you ask for HW extension on day $n - 2$ or before, you need to show that you have completed **50%** of the HW and you will get 2 more days after the deadline; The HW extensions would only be given in these cases. **You only have 3 opportunities of requesting a HW extension.** You should ask **TF** for the HW extension.

- **Make-up policy for quizzes + exams:**

- (1) **no make-up for in-class quizzes in any case.**
- (2) Make up mid-terms will be given only in extreme circumstances, and only when accompanied by appropriate documentation. Any student with a valid reason to be given a make up exam **MUST** contact me **at least the day before the exam**, either by email or in person, and present necessary documentation. Any request of a make-up mid-term on the day of mid-term or after will be denied automatically.²

- **Use OF Generative AI.**³ Generative artificial intelligence tools (GenAI) – software that creates new text, images, computer code, audio, video, and other content – have become widely available. Well-known examples include CoPilot, Gemini, ChatGPT, and DALL•E, among others. You can use AI tools as a teaching assistant to help understand complex concepts from my lectures or your readings, ensuring you can articulate them in your own words. However, beware that the descriptions may contain errors or not reflect how we expect you to use the

¹If you do not know how to submit the HW assignment on gradescope, please come to the office hours of the instructor/TF for help.

²One of the exceptions I could think of is that: something unexpected and big happened and prevented you from contacting me the day before the actual mid-terms.

³This policy is taken/adapted from MA213/MA214 courses, the credit goes to Professor Jonathan Huggins.

concepts in these courses. You can also generate practice problems on a particular topic: While GenAI can create many plausible-looking practice questions, there is no guarantee they reflect what is on the quizzes or the GenAI will provide you with correct solutions. Please **NOTE THAT no GenAI use is allowed for Quizzes, exams**. If you use generative AI tools to complete assignments in this course, in ways that are not explicitly authorized, the course instructors will apply the Boston University Code of Academic Integrity as appropriate to your specific case. If you are unsure about your use of AI, it is best to check in with me in advance. In addition, you must be wary of unintentional plagiarism or fabrication of data. Please act with integrity, for the sake of both your personal character and your academic record. The following are examples of how you may not use AI in this course:

- (1) Generating solutions to problems: Using GenAI directly to give solutions to a problem without engaging with the problem yourself.
- (2) Directly copying any assignment content into a tool or paraphrasing assignment content without engaging with the material yourself
- (3) Any tool usage in Quizzes, exams
- (4) Summarizing readings: Using AI to summarize readings without engaging with the material yourself.
- (5) Drafting text: Generating outlines or written content using AI. All outlines and ideas should originate from you.

• **Academic Conduct.** All Boston University students are expected to maintain high standards of academic honesty and integrity. It is your responsibility to be familiar with the Academic Conduct Code, which describes the ethical standards to which BU students are expected to adhere and students' rights and responsibilities as members of BU's learning community. All instances of cheating, plagiarism, and other forms of academic misconduct will be addressed in accordance with this policy. Penalties for academic misconduct can range from failing an assignment or course to suspension or expulsion from the university. <https://www.bu.edu/academics/policies/academic-conduct-code/>

• **Disability and Access Services.** Students with documented disabilities, including learning disabilities, may be entitled to accommodations intended to ensure that they have integrated and equal access to the academic, social, cultural, and recreational programs the university offers. Accommodations may include, but are not limited to, additional time on tests, staggered homework assignments, note-taking assistance. If you believe you should receive accommodations, please contact the Office of Disability & Access Services to discuss your situation. This office can give you a letter that you can share with instructors of your classes outlining the accommodations you should receive. The letter will not contain any information about the reason for the accommodations. If you already have a letter of accommodation, you are encouraged to share it with your instructor as soon as possible. <https://www.bu.edu/disability/> Students with an accommodation letter will have 50% more time for the mid-term and final exams; they can use the Accommodated Testing Center ← <https://www.bu.edu/disability/academic-testing-center/>

- **Preliminary Schedule** [HW1 sub. means HW1 submission deadline = 5pm, 09/16]

Week	Monday	Wednesday
Week 1	No Class	Sept. 2: Chapter 1 (1/2)
Week 2	Labor day (no class)	Sept. 9: Chapter 1 (2/2)
Week 3	Sept. 14: Chapter 2 (1/2)	Sept. 16: Chapter 2 (2/2) [HW1 sub.]
Week 4	Sept. 21: Chapter 3 (1/3)	Sept. 23: Chapter 3 (2/3) [HW2 sub.]
Week 5	Sept. 28: Chapter 3 (3/3)	Sept. 30: Chapter 4 (1/3)
Week 6	Oct. 5: Chapter 4 (2/3)	Oct. 7: Chapter 4 (3/3) [HW3 sub.]
Week 7	Oct. 13 (Tues.)* : Ch. 5 (1/2)	Oct. 14: Midterm I
Week 8	Oct. 19: Chapter 5 (2/2)	Oct. 21: Chapter 6 (1/2) [HW4 sub.]
Week 9	Oct. 26: Chapter 6 (2/2)	Oct. 28: Chapter 7 [HW5 sub.]
Week 10	Nov. 2: Chapter 8 (1/3)	Nov. 4: Chapter 8 (2/3) [HW6 sub.]
Week 11	Nov. 9: Chapter 8 (3/3)	Nov. 11: Midterm II
Week 12	Nov. 16: Chapter 9 (1/3)	Nov. 18: Chapter 9 (2/3) [HW8 sub.]
Week 13	Nov. 23: Chapter 9 (3/3)	Thanksgiving Recess
Week 14	Nov. 30: Chapter 10 (1/3)	Dec. 2: Chapter 10 (2/3) [HW9 sub.]
Week 15	Dec. 7: Chapter 10 (3/3)	Dec. 9: Final review [HW10 sub.]

Dec. 14 – 18: **Final Exam** period

* October 13 (Tuesday) substitutes the Monday (Oct. 12) schedule.