



湖北工业大学
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Introduction to Probability
Course Code	STAT 2311
Semester	Winter 2026
Course Length	5 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	MATH 1112 Calculus II

Course Description:

This course introduces the mathematical foundations and applied methods of probability. Students explore counting techniques, probability rules, conditional probability and Bayes' theorem, random variables and distributions, expectation and variance, moment-generating functions, and major discrete and continuous probability models such as the binomial, Poisson, exponential, and normal distributions. The course culminates with limit theorems including the law of large numbers and the central limit theorem. Emphasis is placed on logical reasoning, analytical problem solving, and real-world applications in science, engineering, and economics.

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical thinking skills** – Students will engage in creative and/or innovative thinking, and/or inquiry, analysis, evaluation, synthesis of information, organizing concepts, and constructing solutions.
- **Communication skills** – Students will demonstrate effective written, oral, and visual communication.
- **Teamwork** – Students will demonstrate the ability to work effectively with others to support a shared purpose or goal and consider different points of view.
- **Social responsibility** – Students will demonstrate intercultural competency and civic knowledge by engaging effectively in local, regional, national, and global communities.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- Construct and analyze sample spaces and events using combinatorial methods;
- Apply axioms of probability, including rules for conditional probability and independence;
- Use Bayes' theorem to update probabilities and interpret real-world inference problems;
- Define and work with discrete and continuous random variables, PMFs, PDFs, and CDFs;
- Identify and model with major discrete distributions and continuous distributions;
- Use moment-generating functions and the central limit theorem to approximate probabilities;
- Apply the law of large numbers and understand convergence concepts;
- Develop inquiry-based approaches to probabilistic modeling and real-world reasoning.

Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:

A First Course in Probability, by Sheldon Ross, Pearson, 10th Edition.

Course Requirements:

Homework Assignments

Students will complete problem sets emphasizing derivations, proofs, and real-world modeling scenarios. Assignments help reinforce conceptual understanding and provide early feedback on problem-solving skills.

Quizzes

Short in-class quizzes check comprehension of recent material and ensure steady progress. These may include multiple-choice questions, short calculations, or concept explanations.

Midterm Exam

The midterm tests the first half of the course, including combinatorial analysis, probability axioms, conditional probability, and discrete random variables. The exam consists of both conceptual and computational questions, reflecting practical applications and theoretical reasoning.

Final Exam

The comprehensive final evaluates students' mastery of all course topics, especially continuous distributions, limit theorems, and the central limit theorem. It includes short problems, proofs, and application questions. A formula sheet will be provided; only the approved calculator may be used.

Assessments: Activity	Percent Contribution
Homework Assignments	25%
Quizzes	15%
Midterm Exam	20%
Final Exam	40%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Grade	Percentage of available points
A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D	64-69
D-	60-63
F	0-59

Course Schedule:

The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, major ones provided in writing.

STAT 2311 Schedule		
Lecture	Topic	Readings
L1	Introduction: The Nature of Probability	Chapter 1
L2	Counting Principles: Permutations and Combinations	Chapter 1
L3	Multinomial Coefficients and Integer Solutions	Chapter 1
L4	Axioms of Probability: Sample Spaces, Events	Chapter 2
L5	Equally Likely Outcomes and Basic Rules	Chapter 2
L6	Conditional Probability and Independence	Chapter 3
L7	Bayes' Theorem and Applications	Chapter 3
L8	Random Variables: Definitions and Discrete Models	Chapter 4
L9	Expectation, Variance, and Functions of Random Variables	Chapter 4
L10	Bernoulli, Binomial, and Poisson Distributions	Chapter 4
L11	Other Discrete Distributions: Geometric, Hypergeometric	Chapter 4
L12	Continuous Random Variables: PDFs and CDFs	Chapter 5
L13	Uniform and Exponential Distributions	Chapter 5
L14	The Normal Distribution and Standardization	Chapter 5
L15	Transformations of Random Variables	Chapter 5
/	Midterm Exam	/
L16	Joint Distributions and Independence	Chapter 6
L17	Conditional Distributions and Sums of Random Variables	Chapter 6
L18	Covariance and Correlation	Chapter 7
L19	Moment Generating Functions	Chapter 7
L20	Conditional Expectation and Prediction	Chapter 7
L21	Chebyshev's Inequality and Law of Large Numbers	Chapter 8
L22	Central Limit Theorem and Applications	Chapter 8
L23	Poisson Process and Rare Events	Chapter 9
L24	Simulation of Random Variables	Chapter 10
L25	Review and Problem Workshop	/
/	Final Exam	/

Accommodation Statement:

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or outside the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:**Attendance and Expectations**

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work

The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs and Disabilities

Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.