King Fahd University of Petroleum and Minerals
Department of Mathematics
STAT 301 Syllabus, Term 252 (2025-26)

Instructor: Dr. Nasir Abbas (nasirabbas@kfupm.edu.sa)

Course Title: Introduction to Probability Theory

Course Credit Hours: 3-0-3

Textbook: A First Course in Probability by Sheldon Ross, 9th edition. Pearson Education, 2014.

Course Main Objectives:
- To present a solid undergraduate foundation in probability theory.
- To solve real life problems related to probability theory.

Course Description: Basic classical models of probability. Set functions. Axiomatic definition of probability. Conditional probability and Bayes' theorem. Random variables and their types. Distributions, moments, and moment generating functions. Special discrete and continuous distributions. Random vectors and their distributions. Marginal and conditional distributions. Independent random variables. Functions of random variables. Sums of independent random variables. Weak law of large numbers and the central limit theorem.

Prerequisite: MATH201, STAT201 or STAT212 or STAT214 or STAT319 or ISE315

Grading Policy:

Activity	Weight
Class Participation (homework, quizzes, attendance, bonuses, etc.)	15%
Exam I	25%
Exam II	25%
Final Exam *(Comprehensive, as per university schedule)*	35%

Letter Grades: The letter grades will follow a grading curve, which depends on the average of all students enrolled in the course.

Exam Questions: The questions of the exams are similar to the examples and exercises in the textbook.

Cheating in Exams: Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of DN in the course along with reporting the incident to the higher university administration for further action. Cheating in exams includes (but is not restricted to):

➢ Looking at the papers of other students.
➢ Talking to other students.
➢ Using mobiles, smart watches or any other electronic devices.

Missing an Exam: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he must bring an official excuse from Students Affairs. Otherwise, he will get a score of zero in the missed exam.

Attendance: Students are expected to attend all classes.

➢ If a student misses a class, he is responsible for any announcement made in that class.
➢ Attendance **on time** is crucial and will be checked at the beginning of each class. Arriving more than 5 minutes after the class starts will be marked as **late**. Every 2 instances of being late will count as 1 absence. Entering the class after half the scheduled class time (25 minutes) has passed will be marked as an absence.
➢ Only excuses issued by the **Students' Affairs** office at KFUPM will be accepted; excuses from other sources, such as medical centers, government or private offices, will not be considered.
➢ After warned **twice** by the instructor, a DN grade will be awarded to any student who accumulates
   • 9 (20%) unexcused absences.
   • 15 (33%) excused and unexcused absences.

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must get permission from their instructor. Violations of these rules will result in a penalty decided by the instructor.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin on the Registrar's website.

Weekly Schedule

Date	Section	Topics (Tentative)
Week 1	Chapter 1 Sections 1-5	Introduction, The Basic Principle of Counting, Permutations, Combinations, Multinomial Coefficients.
Week 2	Chapter 2 Sections 1-4	Introduction, Sample Space and Events, Axioms of Probability, Some Simple Propositions.
Week 3	Chapter 2 Sections 5-6	Sample Space, Having Equally Likely Outcomes, Probability as a Continuous Set Function.
Week 4	Chapter 3 Sections 1-3	Introduction, Conditional Probability, Bayes' Formula
Week 5	Chapter 3 Sections 4-5	Independent Events, Is $P(. \mid F)$ a Probability?
Week 6	Chapter 4 Sections 1-4	Random Variables, Discrete Random Variables, Expected value, Expectation of a Function of a Random variable, Variance.
Week 7	Chapter 4 Sections 6-7	The Bernoulli and Binomial Random Variables, The Poisson Random variable.
Week 8	Chapter 4 Sections 8-10	Other Discrete Probability Distributions, Expected Value of Sums of Random Variables, properties of the Cumulative Distribution Function
Week 9	Chapter 5 Sections 1-5	Introduction, Expectation and Variance of Continuous Random Variables, The Uniform Random Variable, Normal random Variables, Exponential Random Variables.
Week 10	Chapter 5 Sections 6-7	Other Continuous Distributions, The Distribution of a Function of Random variables.
Week 11	Chapter 6 Sections 1-3	Joint Distribution Functions, Independent Random variables, Sums of Independent Random variables.
Week 12	Chapter 6 Sections 4-7	Conditional Distributions: Discrete Case, Conditional Distributions: Continuous Case, Order Statistics, Joint Probability Distribution of Functions of Random Variables.
Week 13	Chapter 7 Sections 1-3	Introduction, Expectation of Sums of Random Variables, Moments of the Number of Events that Occur.
Week 14	Chapter 7 Sections 4-7	Covariance, Variance of Sums, and Correlations, Conditional Expectation, Conditional and Prediction, Moment Generating Functions
Week 15	Chapter 8 Sections 1-5	Introduction, Chebyshev's Inequality and WLLN, The Central Limit Theorem, The SLLN, Other Inequalities. (if time permits)