Course Title:	Probability & Probability Distributions-I
Course Code:	STAT-303
Semester:	V
Credit Hours:	3 Credit Hours
Pre-requisites:	N / A

Learning Outcomes
By the end of this course, students will be able to:
1. Derive the probability function and properties of various discrete and continuous distributions.
2. Grasp the knowledge of the practical applications of these distributions.
3. Learn the relationship between different distributions.

Course Outline
Unit 1
1.1 Random Variables
Distribution function, probability function and probability density function, mean, variance and shape. Moments, factorial moments and cumulants. Probability generating function. Moments generating function. Cumulant generating function. Chebyshev inequality.
Unit 2
2.1 Discrete Univariate Distributions
Uniform, binomial, hyper-geometric, multinomial, Poisson, geometric and negative binomial distributions with their applications. Normal approximation to the Binomial and Poisson distribution (just application).
2.2 Continuous Distributions
Continuous uniform, exponential, gamma, Beta, lognormal, Pareto, Cauchy and Weibull distributions along with their properties.

- **Teaching-learning Strategies:**
Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

- **Assignments-Types and Number with calendar:**
According to the choice of respective teacher.

- **Assessment and Examinations:**
According to the University's Semester Rules.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course

			the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Text Books
1. Hogg, R.M., McKean, J., & Craig, A.T. (2013). *Introduction to Mathematical Statistics*. Prentice Hall, New Jersey, USA.
2. Milton, J.S., & Arnold, J.C. (2003). *Introduction to probability and statistics*. McGraw Hill.

Suggested Readings
1. Hirai, A.S. (2002). *A Course in Mathematical Statistics.* Ilmi Katab Khana, Lahore.
2. Mood, A.M., Graybill, F.A., & Boes, D.C. (2007). *Introduction to the Theory of Statistic*. McGraw Hill, New York, USA
3. Ross, S.M. (2003). *Introduction to probability modes*. Academic press.