Probability and Statistics (Spring 2025)
Weekly plan with Question Numbers

Week	Theory Contents/Topics	Question/ Examples	Sections
1	**Descriptive statistics :** Basic definition , Types of variables ,Mean, Median, Mode, Variance,Standard Deviation, Quartiles, Deciles, Percentiles, IQRange	NW Exercise # 2.3 Questions 2.52-2.71	NW [2.1 – 2.4, 3.1 – 3.4]
2	**Graphical representation of data** : Bar chart , histograms, box plot, ogives ,frequency curve, Skewnwss and Kurtosis (discuss w.r.t geometry only) **Sample Space and Event:** Sample point, tree diagram, set theory, and venn diagram	NW Exercise # 2.2 Questions 2.18-2.29 NW Exercise # 3.3 Questions 3.113-3.135 NW Questions 3.62-3.78 WP Questions 2.1-2.13	NW [2.2 – 2.4] WP [2.1 – 2.3]
3	Counting techniques, Probability of an event, Additive rules	WP Questions 2.21-2.48	WP [2.4 – 2.5]
4	**Axioms of Probability:** Conditional Probability, Independence and Multiplicative rules.Bayes' Rules	WP Questions 2.49-2.65 WP Questions 2.73-2.89 WP Questions 2.95-2.100	WP [2.6 – 2.7]
5	**Discrete Random Variables and their distributions:** Distribution of random variables: Main concept of random variables (CLO-1), PMF and CDF and Types of random variables	MB Questions	MB [3.1 , 3.2]

	Distribution of random vector: Joint and Marginal distributions and independence of random variables	3.1-3.24, 3.28	
6	**1st Mid Term Exam**		
7	**Expectation and Variance (Discrete):** Expectation, Expectation of a function, properties, Variance and Standard Deviation, Covariance and Correlation **Families of Discrete Distributions:** Binomial distribution and Poisson distribution	MB Questions 3.1-3.24, 3.28 WP Questions 5.4-5.20, 5.25-5.28, 5.56-5.58,5.67,5.71	MB [3.1.1 - 3.3.5] MB[3.4.2, 3.4.5-3.4.6]
8	**Continuous Probability Distributions** PDF and CDF Joint Probability Distribution, marginal distribution (CLO-2) Mean & Variance of a Continuous Random Variable, Covarriance, and Correlation (CLO-2) Uniform, Normal and standard normal distributions and their applications (CLO-2)	MB Questions 4.1-4.5,4.16-4.26 WP Examples 6.1-6.8 Questions 6.3-6.9	MB [4.1, 4.2.1, 4.2.4]
9	**Estimation** Introduction, confidence interval estimation using z & t distributions for single mean and difference between two means	WP Questions 9.1-9.5, 9.9- 9.18 and all solved examples related to the topic	WP [9.1 – 9.5, 9.8]
10	**Hypothesis Testing:** Testing of hypothesis for single mean and difference between two means using z-test and t-test Z(CLO-3), p-value method (CLO-3)	WP Questions 10.19-10.46	WP[10.1 – 10.5]
11	**2nd Mid Term Exam**		
12	**Regression & Correlation:** Scatter diagram (CLO-2) .Introduction to linear regression. The simple linear regression model (CLO-3), Method of least square and **Gradient Descent method** w.r.t regression (material will provide) (CLO-3),	WP Questions 11.1-11.9, 11.11-11.14	WP [11.1 – 11.3. 11.12]
13-14	Simple Correlation (CLO-2), coefficient of determination (CLO-2) **Inferencing of simple linear regression co-efficients**	WP Examples 11.2-11.5 Questions	WP[11.12] WP [11.5]

	Multiple linear Regression : Multiple regression (CLO-3) and correlation (CLO-2) , coefficient of determination (CLO-2), assumptions (CLO-2) and polynomial regression	11.17-11.22 WP Questions 12.1-12.10	WP [12.1 – 12.2]
15	**Analysis of variance:** ANOVA (CLO-3)	NW Questions 16.42-16.47	WP [13.1, 13.2]
16	Revision		