 **National University** 

**Of Computer & Emerging Sciences**

**Karachi Campus**

**Course Outlines of BS (CS) Degree Program**

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| **Course Instructor** | Mr. Osama Bin Ajaz | **Semester** | Fall 2021 |
| **Batch/Section(s)** | Batch 2020 | **Year** | 2021 |
| **Course Title** | MT205-Probability and Statistics | **Credit Hours** | 3 |
| **Prerequisite(s)** | Calculus 1 & 2 | **Course TA** | 1AZZZ |

**Text Book(s)**

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| Title of book | Probability & Statistics for Engineers & Scientists, 9th Edition | |
| Author(s) | Walpole, Myers, Myers YE |

**Reference Book(s)**

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| **1-Probability And Statistics For Engineering And The Sciences**, Jay L Devore 8th Edition |
| 2-Introductory statistics , Neil A.Weiss , 9rd Edition |

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| **Course Objective:** |
| The course is designed to:   * Develop the understanding of probability, random variables and random processes * To be proficient at manipulating data to draw insights and probe research questions. * Enhance the capabilities of data interpretation. * Develop the necessary software skills like EXCELL,MINITAB, SPSS |

**Tentative Weekly Lectures Schedule:**

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| **Week** | **Theory Contents/Topics** | **Sections** |
| 1 | **Descriptive statistics :**  Basic definition , Types of variables ,Mean, Median, Mode, Variance,Standard Deviation, Quartiles, Deciles, Percentiles, IQRange | WP [1.1, 1.3, 1.4, 1.6] &  NW [ 2.1 – 2.4, 3.1 – 3.4] |
| 2 | **Graphical representation of data** :  Construction of bar chart , histograms, Stem-leaf plots,box plot,ogive,frequency curve, Skewnwss and Kurtosis. | WP [1.3, 1.6] & NW [ 2.2 – 2.4] |
| 3 | **Sample Space and Event:**  Sample point,tree diagram,set theory ,venn diagram | WP [ 2.1 – 2.3] |
| 4 | Counting techniques, Probability of an event, Additive rules | WP [2.4 – 2.5] |
| 5 | **Axioms of Probability:**  Conditional Probability, Independence and Multiplicative rules.Bayes’ Rules | WP [ 2.6 – 2.7] |
| 6 | **1st Mid Term Exam** |  |
| 7 | **Random Variables & Probability Distributions:**  Concept of random variable **Discrete Probability Distribution**, PMF, CDF, joint probability distribution, marginal distribution | WP [3.1-3.2, 3.4] |
| 8 | **Continuous Probability Distributions** PDF and CDF  Joint Probability Distribution, marginal distribution | WP [ 3.3, 3.4] |
| 9 | **Mathematical Expectations:**  Mean & Variance of a Random Variable, Covarriance, and Correlation | WP [4.1, 4.2] |
| 10 | Binomial, Poisson, Normal and standard normal distributions and applications | WP [ 5.1, 5.2, 5.5, 6.2 – 6.4] |
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| 11 | **2nd Mid Term Exam** |  |
| 12 | **Estimation & Hypothesis Testing:**  Introduction, confidence interval estimation using z & t distributions for single mean and difference between two means,Testing of hypothesis for single mean and difference between two means using z- p-value method | WP [ 9.1 – 9.5, 9.8, 10.1 – 10.5] |
| 12 | **Independent & Dependent sample tests:**  One-sample t-test, independent and depenent sample t-tests, confidence intervals | WP [ 9.1 – 9.5, 9.8, 10.1 – 10.5] |
| 14 | **Regression & Correlation:**  Scattered diagram.Introduction to linear regression.  The simple linear regression model  Simple Correlation ,coefficient of determination | WP [ 11.1 – 11.3. 11.12] |
| 15 | **Multiple linear Regression :**  Multiple regression and correlation , coefficient of determination , assumptions | WP [12.1 – 12.2] |
| 16 | **Analysis of variance:**  ANOVA | WP [13.1, 13.2] |
| 17 | **Final Exam** |  |

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| Particulars | Marks Distribution (%) |
| Mid-I | 15 |
| Mid-II | 15 |
| Final | 50 |
| Assignments / Quizzes | 20 |
| Total | 100 |