**QTM 520- Business Statistics**

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| Resource Person: | **Dr. Saira Sharif** |
| Email: | Saira.sharif@umt.edu.pk |
| Contact Hours: | Monday 05:00 PM - 06:30 PM |
| Office Address: | 3N - 03  |
| Programme: | MBA |
| Section: |  |
| Semester: | Fall 2022 |
| Course Pre-requisites: | NA |
| Credit Hours: | 3  |
| Course Type: | Final Semester – MBA |
| Venue/Day/Time: |  / Monday / 6:30pm – 9:30pm |
| Course URL (if any): |  |

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| **Course Description:** |
| At the core, the course “Business Statistics” is aimed to communicate, that how to develop understandings and make decisions based on critical analysis of data sets. It is aimed to provide a foundation for insights of statistical concepts & tools and effective presentation of Business models using Graphs & Charts, Measure of Locations & Dispersion.Also offers Essential understanding of necessary mathematical & Statistical background for advance courses in the areas of Business, Finance, Operations, and Economics. This course will help apprentices to gain confidence leveraging statistics to create strong business cases and make intelligent business decisions. This examines the use of descriptive and inferential statistics, Comparative analysis, probability, analysis of variance, regression, correlation analysis and association, Testing of Hypothesis, and applications of technology for statistical analysis, including the interpretation of the relevance of statistical findings for business problem solving and decision making. And allows to get a good grasp of appreciation to acquire a feel for the statistical thinking and planned the experience the good understanding of statistics, tools of the skill involve a real appreciation for reasoning and concepts. |

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| **Course Teaching Methodology:** |
| * Interactive lectures with comparative analysis based on case studies.
* Data Analysis and effective Presentation of real world Business Applications
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| **Programme Educational Objectives (POs): MBA** |
| PO1 | To inculcate reasoning, critical analytical, problem-solving, and decision-making skills. |
| PO2 | To provide real-life work experiences.  |
| PO3 | To provide opportunities to network with employers and entrepreneurs. |
| PO4 | To develop future leaders, managers, and entrepreneurs for the digital and globalized world. |
| PO5 | To develop effective presentation, oral, and written communication skills. |
| PO6 | To expose students to the important social, environmental, economic and ethical issues. |

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| **Programme Learning Outcomes (PLOs): MBA****After completing this degree programme, students shall be able to:** |
|  | **Mapping the PLOs with POs** |
| PLO1 | Critically analyze complex business situations and make appropriate decisions. |  |
| PLO2 | Successfully negotiate with the challenging work demands. |  |
| PLO3 | Apply organizational theories, models, and frameworks to the real-world business situations to solve managerial issues. |  |
| PLO4 | Communicate effectively and efficiently, and deliver professional business presentations. |  |
| PLO5 | Analyze and evaluate market opportunities and develop viable business plans. |  |
| PLO6 | Use digital technologies and data analytics tools to make informed decisions. |  |

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| **Course Learning Outcomes (CLOs):****After completing this course, students shall be able to:** |
|  | **Mapping the PLOs**  |
| CLO1 | Distinguish among different scales of measurement and their implications for solving problems and identify the advantages and disadvantages of each as applied. | PLO1 |
| CLO2 | Apply the fundamental and advance concepts learned in the course with descriptive measures, presentation and interpretation to develop business plans and ultimate recommendations for solution/s. | PLO4 |
| CLO3 | Comprehend a critical analysis for complex situations and list both areas of analysis and decisions. | PLO1 |
| CLO4 | Based on the logical data analysis present and defend the Probability that an event will occur using normal distribution. | PLO1 |
| CLO5 | Consider, calculate and perform as a responsible statistician to make informed decisions. | PLO6 |

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| **Assurance of Learning and Assessment Items:***Specify Assessment Items that will assure student learning through application and achieve objectives of specific PLOs / COs / CLOs* |
| **Assessment Item** | **Application/ Objectives****CLO** |
| Class Participation | **CLO1** |
| Assignment | **CLO2, CLO4, CLO3** |
| Quiz | **CLO2, CLO3, CLO4** |
| Mid Term Exam | **CLO1, CLO2** |
| Final Term Exam | **CLO3, CLO4, CLO5** |

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| **Assessment Structure and Grading Policy\*:** |
| **Assessment Item** | **Weight (%)** | **Execution Plan** |
| Class Participation | 10 |  |
| Assignment | 15 | 3-4 Assignments  |
| Quiz | 15 | 3-4Quizzes |
| Mid Term exam | 30 | One-time assessment |
| Final Term Exam | 30 | One-time assessment |
| **Total**  | **100** |  |
| **Notes – Norms and Important Class Policies:*** **Class Policy**: You are required to be in class at the assigned time. If you arrive more than ten minutes late, you will be marked absent.
* **Email Policy**: You will be responsible if you miss a deadline because you did not read your email. Participants should regularly check their University email account.
* **Class Attendance Policy**: A minimum 80% attendance is required for a participant to be eligible to sit in the final examination. Reporting sick and attending family functions (such as a wedding) will be considered as absent. Participants with less than 80% attendance in a course will be given grade ‘F’ (Fail) and will not be allowed to take the final exam. An ‘F’ grade will negatively impact student’s CGPA.
* **Mobile Policy**: Switch off your mobile phones while in class.
* Withdrawal Policy: Students may withdraw from a course till the end of the 12th week of the semester. In such a case, a grade ‘W’ will be awarded. A ‘W’ grade will not impact student’s CGPA. A student withdrawing after the 12th week will be awarded ‘F’ grade, which will negatively impact CGPA.
* **Harassment Policy**: Sexual or any other form of harassment through physical, verbal or electronic (mobile, email, etc.) means is constituted as punishable offence. Such actions will not be tolerated.
* **Use of Unfair Means/Honesty Policy**: Any participant found using unfair means or assisting another participant during a class test, quiz, assignment, examination, etc. will be liable for strict disciplinary action.
* **Plagiarism Policy**: Plagiarism is defined as the practice of taking someone else's work or ideas and passing them off as one's own. The participants will submit the plagiarism report to the resource person with every assignment, report, project, thesis, etc. A participant who fails to submit the ‘Turnitin’ report will receive ‘F’ grade that will count towards CGPA. If participants attempt to cheat ‘Turnitin,’ they will receive an additional ‘F’ that will count towards their CGPA. Look up the Student Handbook for further information on rules and regulations regarding plagiarism while submitting final report and other documents.
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| **Week** | **Topics / Contents** | **Application/Objectives****CLO** |
| 1 | **What, Where, Why, and How of Data Collection:*** What is the difference between Statistics and Business Statistics?
* Population & Sample
* Parameter & Statistic
* Data & its types
* Data Measurement Levels
* Sampling procedures: Simple Random Sampling, Stratified Random Sampling, Systematic Sampling and Cluster Sampling
 | CLO1 |
| 2 | **Description of Data:*** Frequency Distributions/classification
* Steps for constructing frequency distributions
* Relative and Joint Frequency Distribution
* cumulative Relative and cumulative frequencies

**Graphical Presentation of Data:*** Bar Charts and Pie Chart
* Histogram and Historigram
* Frequency polygon and curve
* Stem and Leaf Diagrams
 | CLO1 |
| 3 | **Describing Data using NumericalMeasures:*** **Measures of Central Location:**
* Parameters and Statistics
* Population and Sample Mean
* Median and Mode
* Weighted Mean, Percentiles, Quartiles
* Box and Whisker Plots

**Assignment #1** | CLO2 |
| 4 | **Describing Data using Numerical Measures:*** **Measures of Variation:**
* Range and Interquartile Range
* Quartile Deviation
* Population Variance & Standard Deviation
* Sample Variance & Standard Deviation
* Coefficient of Variation
* The Empirical Rule
* Tchebysheff’s Theorem

Standardized Data Values**Quiz #1** | CLO2 |
| 5 | **Probability and Probability Distributions:*** **The Basics of Probability**
* Important Probability Terms
* Methods of Assigning Probability
* The Rules of Probability
* Addition Rules
* Measuring Probability
* Conditional Probability
* Multiplication Rules
 | CLO4 |
| 6 | **Discrete Probability Distributions:*** Random Variables
* Displaying Discrete Probability Distributions Graphically
* Mean and Standard Deviation Discrete Probability Distributions
* Binomial Probability Distribution
* Poisson Probability Distribution
* Hypergeometric Probability Distribution

Mean and Standard Deviation of Discrete Probability Distributions**Assignment # 2** | CLO4 |
| 7 | **Continuous Probability Distributions:*** The Normal Probability Distribution
* The Standard Normal Probability Distribution
* Approximate Area under the Normal Curve
* Uniform Probability Distribution

The Exponential Probability Distribution**Quiz #2** | CLO4 |
| 8 | **Mid Term xam** |  |
| 9 | **Introduction to Sampling Distributions:*** Sampling Error: What it is and Why it Happens
* Calculating Sampling Error
* The Role of Sample Size in Sampling Error
* Sampling Distribution of the Mean
* For known and unknown population standard deviation.
* The Central Limit Theorem
* Sampling Distribution of a Proportion
* Working with Proportion
 | CLO2 |
| 10 | **Estimating Single Population Parameters:*** Point of Confidence Interval Estimates for a Population Mean:
* Points Estimates and Confidence Intervals
* Interval Estimate for the Population Mean, σ Known Confidence Interval Calculation
* Impact of the Confidence Level on the Interval Estimate
* Impact of the sample size on the Interval Estimate
* Confidence Interval Estimates for a Population Mean, σ Unknown student’s t-distribution

Estimation with Larger Sample Size | CLO3 |
| 11 | **Estimating Single Population Parameters:*** Determining the Required Sample size for Estimating a Population Mean:
* Determining the required Sample size for Estimating µ, σ Known
* Determining the required Sample size for Estimating µ, σ Unknown

**Estimating a Population Proportion*** Confidence Interval Estimate for a Population Proportion

Determining the Required Sample size for estimating a Population Proportion | CLO3 |
| 12 | **Introduction to Hypothesis Testing:*** Hypothesis Tests for Means
* Formulating the Hypothesis
* Null and Alternative Hypothesis
* Testing a Research Hypothesis
* Testing a claim about the Population
* Types of Statistical Errors
* Significance Level and Critical values
* Hypothesis test for $µ$, σ Known
* Calculating Critical Values
* Decision Rules and Test Statistics.
* Hypothesis Tests for Means:
* Types of Hypothesis test
* P-Value Approach
* P-value for Two-Tailed Test
* Hypothesis test for $ µ$, σ Unknown

**Hypothesis tests for Population Proportion*** Testing a hypothesis about a single population proportion
* Types of Error
* Calculating Beta
* Controlling Alpha and Beta
* Power of the Test

**Assignment #3** | **CLO4, CLO3** |
| 13 | **Estimation and Hypothesis Testing for two Populations*** Estimation for two Population Means using Independent Samples
* Estimating the difference between two population means when σ1 and σ2 are known, using Independent samples
* Estimating the difference between two population means when σ1 and σ2 are unknown, using Independent samples
* What if the populations Variances are not equal?
* Hypothesis test for two Population means using Independent Samples
* Testing for µ1- µ2 when σ1 and σ2 are known, using Independent samples using P-Values
* Testing for µ1- µ2 when σ1 and σ2 are Unknown, using Independent samples
* What if the Population Variances are not equal?

**Interval Estimation and Hypothesis test for paired samples** * Why use paired samples?
* Hypothesis testing for paired samples
* Estimation and Hypothesis Test for two Population Proportions
* Estimating the difference between two Population Proportions
* Hypothesis test for the difference between two Population Proportions

**Quiz # 3** | **CLO4, CLO5** |
| 14 | **Introduction to Linear Regression and Correlation Analysis*** **Scatter Plots and Correlation:**
* Correlation Versus Regression
* The Correlation Coefficient
* Significance test for the Correlation
* Cause and effect Interpretations
* The Regression Model and Assumption
* Meaning of the Regression Coefficient
* Least square Regression properties
* Significance test in Regression Analysis
* The Coefficient of Determination, R2
* Significance of the slope Coefficient
* **Uses for Regression Analysis**
* Regression Analysis for Description
* Regression Analysis for Prediction
* Confidence interval for the average y, Given x
* Prediction interval for a Particular y, Given x

Common problems Using Regression analysis**Assignment #4** | **CLO5** |
| 15 | **Analysis of the Variance:*** One-way analysis of the variance
* The Logic behind one-way ANOVA
* Partitioning the sum of square
* The ANOVA Assumptions
* Applying One-way ANOVA
* The turkey-Karmer Producer for multiple comparisons
* Fixed effects versus Random Effect in analysis of Variance

**Randomized complete Block Analysis of Variance:*** Randomized complete block ANOVA
* Was blocking necessary?
* Fisher’s Least Significant difference Test

**Quiz # 4** | **CLO5** |
| 16 | Final Term Examination | **CLO3,** **CLO4, CLO5** |