**Statistics-QM120**

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| Resource Person: |  |
| Email: |  |
| Contact Hours: |  |
| Office Address: |  |
| Programme: | Cohort |
| Section: |  |
| Semester: |  |
| Course Pre-requisites: | Mathematics |
| Credit Hours: | 03 |
| Course Type: | Mixed: Theory and Practice |
| Venue/Day/Time: |  |
| Course URL (if any): |  |

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| **Course Description:** |
| This course is aimed to provide a review of basic statistical concepts and tools, along with a more detailed discussion on their applications in Social Sciences. This course will also provide necessary algebra background for advance courses in the areas of Social Sciences and Humanities.  **Learning Objectives**  The objectives of the course are to gain knowledge of following topics in Statistics:   * How, where, when and why data collection, Descriptive and Inferential Statistics. * Classifications, Graphs and Charts, Measure of Locations and Dispersion, Sampling methodologies * Business applications in various domains, Discrete and Continues probability distributions.   **Learning Outcomes**  Upon successfully completing this course, the participants will be able to:   * Discuss and review data collection concepts and tools. * Describe how to apply different sampling techniques, basic statistical concepts and quantitative methods relate to decision making in areas of (applied) Psychology, Social Media, Business, Finance, Marketing, Economics and other social sciences subjects by using Ms. Excel. * Guide how to apply statistics in social sciences using different methods extensively in their careers. |

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| **Course Teaching Methodology:** |
| Interactive-Hybrid Classes |

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| **Programme Educational Objectives (POs):** | |
| PO-1 | To learn the importance of data in real life, how to transform data into information, the role of business statistics in terms of practical applications of statistics in Social Sciences and corporate world. |
| PO-2 | To learn some of the most frequently used tools and techniques for describing the data. |
| PO-3 | To construct and interpret a frequency histogram, various types of bar charts, interpreting trends trough line and scatter graphs of data. |
| PO-4 | To interpret mean, median, mode, and weighted mean for a set of data and understand what these values represent, to construct box and whisker plot and interpret it. |
| PO-5 | To compute the range, interquartile range, variance, variance, and standard deviation and know what these values mean, to compute a z score and the coefficient of variation and understand how they are applied in decision making situations. |
| PO-6 | To understand three approaches to assigning probabilities |
| PO-7 | To understand the conditions where addition and multiplication rules are applied, to understand and interpret the conditional probability. |
| PO-8 | To understand and deal with application situations where random variable is continuous instead of discrete. |
| PO-9 | To determine the probabilities using the standard normal distribution, and to calculate the probabilities |
| PO-10 | To determine the probabilities using the standard normal distribution and to calculate the probabilities |
| PO-11 | These topics intend to discuss the difference between point estimates and confidence intervals. |
| PO-12 | How these concepts are helpful for quality control and in decision making. |
| PO-13 | This topic plans to discuss the most important feature of inferential statistics which is hypothesis testing, the situations under which it is used. |
| PO-14 | How it is used in decision making and its significance in terms of completing and carrying out different research projects. |

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| **Programme Learning Outcomes (PLOs):**  **After completing this degree programme, students shall be able to:** | | |
|  | | **Mapping the PLOs with POs** |
| PLO-1 | Students will understand some basic background of data collection and uses of primary data. | PO-1-PO3 |
| PLO-2 | Students will learn the concepts of data handling using descriptive statistics. | PO-1-PO3 |
| PLO-3 | Students will be trained the applications and implementations of Graphs and Charts. | PO-1-PO3 |
| PLO-4 | Students will recognize the numerical Measures with respect to location and will able to identify outlier in any given data | PO-2-PO4 |
| PLO-5 | Students will become skilled at the use of different types of measure of dispersions. | PO-2-PO5 |
| PLO-6 | Students will be able to check data variation and to check normality of the data. | PO-3-PO7 |
| PLO-7 | Students will become skilled at the use of Probability, Rules and applications of basic probability. | PO-4-PO10 |
| PLO-8 | Students will become skilled at the use of Probability, Rules and applications of basic rules of probability. | PO-43-PO8 |
| PLO-9 | Students will understand the applications of discrete probability distributions. | PO-3-PO11 |
| PLO-10 | Students will understand the applications of continuous probability distributions. | PO-5-PO12 |
| PLO-11 | Students will understand the applications of continuous probability distributions. | PO-3-PO12 |
| PLO-12 | Students will become skilled at the applications of industrial quality control confidence limit for population parameter using sample information. | PO1-PO12 |
| PLO-13 | Students will become skilled at the applications of industrial quality control confidence limit for population parameter using sample information. | PO3-PO12 |

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| **Course Objectives (COs)** | |
| CO-1 | How, where, when and why data collection, Descriptive and Inferential Statistics. |
| CO-2 | Classifications, Graphs and Charts, Measure of Locations and Dispersion, Sampling methodologies |
| CO-3 | Business applications in various domains, Discrete and Continues probability distributions. |

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| **Course Learning Outcomes (CLOs):**  **After completing this course, students shall be able to:** | | |
|  | | **Mapping the CLOs with PLOs** |
| CLO-1 | Discuss and review data collection concepts and tools. | PLO1-PLO12 |
| CLO-2 | Describe how to apply different sampling techniques, basic statistical concepts and quantitative methods relate to decision making in areas of (applied) Psychology, Social Media, Business, Finance, Marketing, Economics and other social sciences subjects by using Ms. Excel. | PLO1-PLO12 |
| CLO-3 | Guide how to apply statistics in social sciences using different methods extensively in their careers. | PLO1-PLO12 |

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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**  **PLO / CO / CLO** |
| Quizzes | All |
| Assignments | All |
| Class Activities | All |
| Mid-term exam | All |
| Final exam | All |

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| **Assessment Structure and Grading Policy\*:** | | |
| **Assessment Item** | **Weight (%)** | **Execution Plan** |
| Quizzes | 15 | 04 |
| Assignments | 15 | 06 |
| Class Activities | 10 | 2 |
| Mid-term exam | 25 | One-time assessment |
| Final exam | 35 | One-time assessment |
| **Total** | **100** |  |
| **Notes – Norms and Important Class Policies:**  *(such as submission guidelines, academic honesty, make-up policy, code of conduct)*  • Be On Time  You need to be at class at the assigned time. After 10 minutes past the assigned time, you will be marked absent.  • Mobile Policy  TURN OFF YOUR MOBILE PHONE! It is unprofessional to be texting or otherwise.  • Email Policy  READ YOUR EMAILS! You are responsible if you miss a deadline because you did not read your email.  Participants should regularly check their university emails accounts regularly and respond accordingly.  • Class Attendance Policy  A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings are absences and will not be counted as present. You have the opportunity to use 6 absences out of 30 classes. Participants with less than 80% of attendance in a course will be given grade ‘F’ (Fail) and will not be allowed to take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip. Otherwise they could reach short attendance.  • Withdraw Policy  Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade W will be awarded to the student which shall have no impact on the calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded “F” grade which shall count in the GPA.  • Moodle  UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. If you are facing any problem using Moodle, visit http://oit.umt.edu.pk/moodle. For further query send your queries to moodle@umt.edu.pk  • Harassment Policy  Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.  • Use of Unfair Means/Honesty Policy  Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.  • Plagiarism Policy  All students are required to attach a “Turnitin” report on every assignment, big or small. Any student who attempts to bypass “Turnitin” will receive “F” grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat “Turnitin”, he/she will receive a second “F” that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.  • Communication of Results  The results of quizzes, midterms and assignments are communicated to the participants during the semester and answer books are returned to them. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course. | | |

*\*Rubrics for all assessments (including mid and final exams) will be provided separately to the students.*

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| **Weekly Sessions Plan:** | | | |
| **Week** | **Topics / Contents** | **Activity** | **Application/Objectives**  **PLO / CO / CLO** |
| 1 | **The What, Where, Why, and How of Data Collection:**  * What is the difference between Statistics and Business Statistics? * Data & its types * Data Measurement Levels * Data Collection Methods * Survey & Design of Sampling * Identification of Sampling procedures |  | All |
| 2 | **Describing the Data:**   * Frequency Distributions/classification * Steps for constructing frequency distributions * Relative and Joint Frequency Distribution * cumulative Relative and cumulative frequencies | Assignment-1 | All |
| 3 | **Graphical Presentation of Data:**   * Bar Charts and Pie Chart * Histogram and Histogram * Frequency polygon and curve * Stem and Leaf Diagrams * Scatter Diagrams and other graphs | Assignment-2 | All |
| 4 | **Describing Data using Numerical Measures:**   * **Measures of Centre and Location:** * Parameters and Statistics * Population and Sample Mean * Median and Mode * Weighted Mean, Percentiles, Quartiles * Box and Whisker Plots | Quiz -1 | All |
| 5 | **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 | Class Activities-1 | All |
| 6 | **Probability and Probability Distributions:**   * **The Basics of Probability** * Important Probability Terms * Methods of Assigning Probability | Quiz -2 | All |
| 7 | **Probability and Probability Distributions:**   * The Rules of Probability * Addition Rules * Measuring Probability * Conditional Probability * Multiplication Rules | Assignment-3 | All |
| 8 | **Discrete Probability Distributions:**   * Binomial Distribution * Poisson Distribution * Hyper geometric Distribution |  | All |
| 9 | **Mid Term** |  |  |
| 10 | **Continuous Probability Distributions:**   * The Normal Probability Distribution * The Standard Normal Probability Distribution * Approximate Area under the Normal Curve | Assignment-4 | All |
| 11 | **Continuous Probability Distributions:**   * The Standard Normal Probability Distribution * Approximate Area under the Normal Curve * Real Life Applications | Quiz -3 | All |
| 12 | **Point of Confidence Interval Estimates for a Population Mean:**   * Points Estimates and Confidence Intervals * Confidence Interval Estimate for the Population Mean, σ Known Confidence Interval Calculation * Impact of the Confidence Level on the Interval Estimate | Assignment-5 | All |
| 13 | **Point of Confidence Interval Estimates for a Population Mean:**   * 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 | Assignment-6 | All |
| 14 | **Introduction to Hypothesis Testing:**   * **Hypothesis Tests for Means:** * Formulating the Hypothesis * Null and Alternative Hypothesis * Why Testing of Hypothesis * Testing a Research Hypothesis * Types of Statistical Errors * Significance Level and Critical values | Quiz -4 | All |
| 15 | **Introduction to Hypothesis Testing:**   * Hypothesis test for , σ Known * Calculating Critical Values * Decision Rules and Test Statistics * Hypothesis test for , σ Unknown | Class Activities-2 | All |
| 16 | Final Term Examination |  |  |

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| **Primary Text Book (s):** |
| * Statistics: A Decision-Making Approach (8th Edition) By: David F. Groebner, Patrick W. Shannon, Phillip C. Fry, Kent D. Smith |

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| **Reference / Supplementary Reading (s):** |
| * Statistical Techniques in Business and Economics (13th Edition) By: Douglas A. Lind, William G. Marchal, and David Wathen * Essentials of Modern Business Statistics with Microsoft Excel (3rd Edition) By: Anderson and Sweeny |

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| **Useful Online / Web Resources:** |
| * https://lms.umt.edu.pk/ |