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| **Course Title** | Applied Calculus | **Course Code** | MT1001 |
| **Department** | Department of Electrical Engineering (DEE) | **Campus** | Lahore |
| **Knowledge Profile** | Mathematics & Computing (WK2) | **Credit Hrs.** | 3 |
| **Knowledge Area** | Mathematics (KA10) | **Grading Scheme** | Relative |
| **HEC Knowledge Area** | Natural Sciences | **Applicable From** | Spring 2023 |
| **Pre-requisite(s)** |  | | |

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| **Course Objective** | Develop a sound understanding of basic concepts of calculus and its applications |

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| **No.** | **Assigned Program Learning Outcome (PLO)** |
| 2 | An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering science. |
| I = Introduction, R = Reinforcement | |
| E = Evaluation, A = Assignment, Q = Quiz, M = Midterm, F=Final, L = Lab, P = Project, W = Written Report. | |

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| **No.** | **Course Learning Outcome (CLO) Statements** | **Assessment Tools** | **Taxonomy Levels** | **PLO** |
| 1 | Solve algebraic equations and inequalities. | Q1, M1 | C3 | 2 |
| 2 | Identify and analyze functions. | A1, M1, F | C4 | 2 |
| 3 | Compute the derivative of a function and apply the concept of differentiation in engineering problems. | M2, Q2, F | C3 | 2 |
| 4 | Identify and evaluate the integral of a function. | A2, M2, F | C6 | 2 |
| 5 | Construct the equation of line/plane in space. | Q3, A3, F | C5 | 2 |

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| **Text Books** | **Title** | Calculus, 8th Edition |
| **Author** | James Stewart |
| **Publisher** |  |
| **Reference Books** | **Title** | Calculus, 6th Edition |
| **Author** | Swokowski |
| **Publisher** |  |
| **Title** | Calculus, 11th Edition |
| **Author** | Thomas |
| **Publisher** |  |
| **Title** | Advanced Engineering Mathematics,9th Edition |
| **Author** | Erwin Kreyszig |
| **Publisher** |  |

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| **Week** | **Course Contents/Topics** | **Chapter\*** | **CLO\*** |
| 1 | Rules of inequalities and Absolute value, Functions and their graphs | Appendix A | 1 |
| 2 | Basic Concepts of limit, how to evaluate limits, Some examples relating to limits, Continuity of functions, Examples relating to continuity, Types of discontinuities. | 2 | 2 |
| 3 | Secant line and tangent line, Slope of tangent line and derivative, Horizontal and vertical tangent, Techniques of differentiation | 3 | 3 |
| 4 | Implicit differentiation and chain rule, Related rates | 3 | 3 |
| 5 | Role’s theorem, Mean Value’s Theorem, Geometrical Interpretation of Role’s and Mean value theorem | 4 | 3 |
| 6 | Extreme values of functions and its applications | 4 | 3 |
| 7 | Horizontal and Vertical Asymptotes | 4 | 3 |
| 8 | Application of derivatives, Velocity and acceleration of particles, Interval in which body is moving forward and interval in which body is moving backward ,Interval of speeding up and slowing down | 5 | 3 |
| 9 | Rate Of Change And Marginal Analysis, L’ Hospital Rule | 4 | 3 |
| 10 | Fundamental theorem of calculus, Techniques of integration, definite integral | 5 | 4 |
| 11 | Integration by parts, Reduction Formulae | 7 | 4 |
| 12 | Improper integrals | 7 | 4 |
| 13 | Area bounded by the curves | 6 | 5 |
| 14 | Lines and planes in space, Vector valued functions and space curves | 13 | 5 |
| **\*Reference book chapters are given in brackets** | | | |

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| **Assessment Tools** | **Weightage** |
| **Quizzes (3), Assignments (3)** | 20.0% |
| **Midterms (I+II)** | 30.0% |
| **Final Exam** | 50.0% |