**University of Management and Technology**

**Course Outline**

Course code…NS128……...... Course title……Applied Calculus……

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| Program | BS Mechanical Engineering |
| Credit Hours | 03 |
| Duration | One Semester |
| Prerequisites | Student should be familiar with classical algebra and trigonometry and has some familiarity with elements of the calculus at the intermediate level. |
| Resource Person | Miss Rubab Manzoor |
| Counseling Timing(Room# ) |

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| --- | --- |
| Monday | 9.00 am-10.30am12.00am-12.30pm |
| Tuesday | 9:00am-9:30am. |
| Wednesday | 9:00am-10:30pm12:00pm-12:45pm. |
| Thursday | 9:00am-9:30am |
| Friday | 9:00am-12:45pm. |

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| Contact | Rubab.manzoor@umt.edu.pk03249442033 |

**Chairman signature………………………………….**

**Dean’s signature…………………………… Date………………………………………….**

**Learning Objective:**

* To prepare the students to understand comparatively the advanced concepts than the concepts they learnt in intermediate classes.
* To enable the students to comprehend the concepts of functions, their properties and calculus of one and more variables.
* To train the student for the use of methods of calculus in engineering.

**Learning Methodology:**

* Lectures
* Interactive
* participative

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

**Marks Evaluation Marks in percentage**

Quizzes 10

Assignments 10

Mid Term 25

Attendance & Class Participation 5

Final exam 50

Total 100

**Recommended Text Books:**

Weir & F.R., J. Hess, Giordano. Thomas' Calculus, Addison-Wesley, 11th Edition.

**Reference Books:**

* Calculus by James Stewart, 5th Edition.
* Schaum’s Outlines Calculus by Jr. Frank Ayres and ElliottMendelson, 5th Edition.

**Calendar of Course contents to be covered during semester**

**Course code……………………………...... Course title………………………………………**

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| **week** |  **Activity** |  **Reference** |
| 1 | Mathematical and physical meaning of functions, graphs of various functions, Piecewise functions, Composition of functions. | Ch-1 |
| 2 | Theorems of limits and their applications to functions. Some useful limits. | Ch-2 |
| 2-3 | Right hand and left hand limits. Continuous and discontinuous functions and their applications. Slopes, Equation of tangents using Limits. | Ch-2 |
|  |
| 3 | Introduction to derivatives, Calculate derivatives by definition, by rules, Derivatives of trigonometric functions. | Ch-3 |
| 4 | Chain Rules and Parametric Equations, Derivative of Composite functions,  | Ch-3 |
| 5 | Implicit Differentiation, Derivative of Rational Powers, Second Derivatives and Slopes, Tangents and Normal Lines. Absolute extreme and Local extreme and critical points | Ch-3,Ch-4 |
| 5 | Increasing and decreasing functions, First derivative tests or monotonic functions and local extrema. | Ch-4 |

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| 6-7 | Definite integrals, Evaluation of integrals by substitution, completing a square, improper fractions, separating fractions, eliminating square root, integrating by parts, improper integrals. | Ch-8 |
| 8 | Mid-Exam |  |
| 9 | Integration of rational functions by partial fractions. | Ch-8 |
| 9 | Trigonometric Integrals, integration by trigonometric substitutions.  | Ch-8 |

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| 10 | Functions of several variables, Domain and range, Partial derivatives. | Ch-14 |
| 11-12 | Application of double integrals, finding regions of Integration, reversing the order of integration. | Ch-15 |
| 13 | Area under double integration, double integration in polar form. Application of triple integrals. | Ch-15 |
| 14 | Vectors, vectors in Plane and space. Dot and Cross products, Gradient and Curl of functions. | Ch-12 |
| 15 | Line integrals | Ch-16 |
| 15 | Definition and applications of Green’s theorem. | Ch-16 |
| 16 | Stoke’s Theorem | Ch-16 |