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| **logoUniversity of Management & Technology**  School of Science & Technology  Department of Mathematics | | | |
| MA 111 Applied Calculus | | | |
| **Lecture Schedule** |  | **Semester** | Fall 2012 |
| **Pre-requisite** | None | **Credit Hours** | 4 |
| **Instructor(s)** | Ifra Noureen | **Contact** | Ifra.noureen@umt.edu.pk |
| **Office** |  | **Office Hours** |  |
| **Teacher Assistant** | N/A | **Contact** | N/A |
| **Office** | N/A | **Office Hours** | N/A |
| **Course Description** | MA111 is a one-semester, four-credit course for introducing the methods of differential and integral calculus. It is assumed that the student is familiar with classical algebra and trigonometry, and has some familiarity with elements of the calculus at the intermediate (higher secondary school) level.  After discussing the calculus of a single variable, the student is introduced to the calculus of two and more variables. The expansion from two to three (or more) dimensions requires a corresponding increase of the student's knowledge of symbolic representation. Partial derivatives and extreme values for functions of two variables are discussed. Then we pass on to vectors differentiation and integration with applications. | | |
| **Expected Outcomes** | * To prepare the students to understand comparatively the advanced concepts than the concepts they learnt in intermediate classes. * To enable the students learn the basic concepts of calculus of one and more variable(s); functions and their properties. * To prepare the student to be able to use the methods of calculus in engineering. | | |
| **Textbook(s)** | **Recommended Text:**  Weir & F.R., J. Hess, Giordano. Thomas' Calculus, Addison-Wesley, 11th edition.  **Reference Text:**  Calculus by James Stewart, 5th Edition.  Calculus and Analytical Geometry, Dr. S. M. Yusuf (Latest Edition) | | |
| **Grading Policy** | Final Term: 50% Mid Term: 25%  Class participation/presentations: 5% Quizzes & Assignments: 20% | | |

**Course Schedule**

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| **Lecture** | **Topics** |
| 1-3 | System of Real numbers, Solution of inequalities, Mathematical and physical meaning of functions, graphs of various functions, Piecewise functions, Even and Odd functions, Composition of functions Hyperbolic functions. |
| 4 – 6 | Theorems of limits and their applications to functions. Some useful limits, right hand and left hand limits. |
| 6 – 7 | Continuous and discontinuous functions and their applications. |
| 8 – 10 | Introduction to derivatives, Geometrical and physical meaning of derivatives, partial derivatives and their geometrical significance, application problems (rate of change, marginal analysis) maxima and minima of a function for single-variable (applied problems) differentials with applications. |
| 11 – 12 | Leibnitz theorem, Roll’s theorem, Mean value theorem. Taylor’s and Maclaurin’s series, Indeterminate forms (0/0), (∞/∞) Asymptotes. |
| 13 – 15 | Tangents and normals, curvature and radius of curvature,  Euler’s theorem, total differentials, maxima and minima of two variables. |
| 16 – 18 | Methods of integration by substitutions and by parts, integration of rational and irrational algebraic functions. |
| 19 -21 | Definite integrals, improper integrals, Gamma and Beta functions. |
| 22 | **Mid Term Exam (8th Week)** |
| 23 | Reduction formulae, Cost function from marginal cost, rocket flights, area under curve. |
| 24-25 | Introduction to vectors, scalar and vector product of three and four vectors, volume of parallelepiped and tetrahedron. |
| 26 – 27 | Vector differentiation, vector integration and their applications, operator. |
| 28 – 30 | Gradient, divergence and curl with their applications. Continuous and discontinuous functions and their applications |
| 31-33 | Definition, double integral as volume, evaluation of double integral. |
| 34 | Change of order of integration |
| 35-40 | Application of double integrals, area, mass of an element, moment of inertia, and centre of gravity. |
| 41 | Triple integrals, evaluation of triple integrals. |
| 42-45 | Application of triple integrals, volume, mass of an element, centre of gravity, moment of inertia by triple integrals, triple integration in cylindrical and spherical coordinates. |