**University of Management and Technology**

**School of Science**

***Department of Mathematics***

**Course Code:** MA 103 **Course Title:** Calculus II

**Program: BS Semester Spring 2020**

**Course Outline Updated**

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| **Schedule**  | As per time table | **Pre-requisite** | Calculus-I |
| **Course Coordinator** | Dr. Ifra Noureen | **Contact** | Ext:3496Cell:  |
| **Course****Description** | MA103 is a one-semester, three-credit hour’s course at the intermediate level in multivariate calculus intended for students who have satisfactorily completed three-credits in Calculus and Analytical Geometry. The expansion from two to three(or more) dimensions requires a corresponding increase of the student's knowledge of symbolic representation. A new element, the vector, a symbolen compassing numbers, puts in its appearance. Students will learn how to work with vectors in modeling and solving problems in multidimensional space. Following this, the calculus of vectors and their description of curves and surfaces in space are considered. Differentiation of vectors is more fully developed, extending elementary notions of differentiation to those involving multiple variables. Integration is developed to encompass double integrals and triple integrals. Finally, line and surface integrals, Green’s and Stoke’s Theorem. Fourier Series: periodic functions, Functions of any period P-2L, Even &odd functions, Half Range expansions, Fourier Transform is considered.**TOPICS*** Multivariate Functions, Domain and Range, Level Curves.
* Partial Derivatives.
* The Chain Rule for Multivariate Functions.
* Gradients and Level Curves.
* Tangent planes and Differentials.
* Extreme Values and the saddle points.
* Double Integrals over Rectangular Regions; Fubini’s 1st Theorem.
* Double Integrals over Non Rectangular Regions; Fubini’s 2nd Theorem.
* *Area by Double Integrals.*
* Double Integrals in Polar Forms.
* Triple Integrals
* Triple integrals in cylindrical and spherical coordinates.
* Line Integrals.
* Vector fields
* Path independence
* Greens Theorem and Applications.
* Fourier Transform/Sequence and Series.
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| **Expected****Outcomes** | * To prepare the students to understand comparatively the advanced concepts than the concepts they learnt in Calculus-I course.
* To make the participants learn the techniques of handling multivariable functions i.e. calculating the limits and continuity of multivariable functions, partial differentiation, multiple integrals, etc.
* To enhance the vision of participants in developing mathematical models of engineering.
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| **Text** **Book(s)** | Thomas’ Calculus,12thedition by G.B. Thomas, 2006, Addison-Wesley |
| **Reference books/ research Papers:** | * Erwin Kreyzing, Advanced Engineering Mathematics, 7thedition,1993, John Wiley and Sons.
* CALCULUS EARLY TRANSCENDENTALS, 10th edition, by H. Anton, I. Bivens, S. Davis, 2012, John Wiley and Sons.
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| **Assignments** | 4 Assignments | **Mid Term****Examination** | 1 Mid TermExamination |
| **Quizzes** | 4 Quizzes | **Final** **Examination** | 1 Final Examination |
| **Attendance** **Policy** | According to university policy |
|  | **Grading Policy** |
| **Assignments**  | 15-20% | **Mid Term****Examination** | 25-30% |
| **Quizzes** | 15-20% | **Final** **Examination** | 35-40% |