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| **Course Title** | **Differential Calculus** | | | | | | |
| **Course Code** | MA1034 | **Lecture hours** | 45 (3 hours per week) | | | | |
| **No. of Credits** | 04 | **Practical hours** |  | | | | |
| **Pre-requisites**  **Course Codes** | Precalculus | **Tutorial hours** | 15 (1 hour per week) | | | | |
| **Course Type** | Core | | | | | | |
| **Learning Outcomes** | | | | | | | |
| At the end of the module student will be able to:  LO1: Determine existence of limit of a function and calculate the limit of a function.  LO2: Calculate derivatives of functions using the rules of differentiation and interpret derivatives.  LO3: Apply rules of differentiation to solve mathematical and practical problems.  LO4: Calculate definite integrals and areas analytically and numerically.  LO5: Apply the Fundamental Theorem of Calculus to calculate derivatives and integrals. | | | | | | | |
| **COURSE CONTENTS** | | | | | **Lecture Hours (45)** | | **Aligned Learning Outcomes** |
| **Limits:** Functions, The Limit of a Function, The Tangent and Velocity Problems, Calculating Limits Using the Limit Laws, The Precise Definition of a Limit, Continuity, The Intermediate Value Theorem  **Derivatives:** Derivatives and Rates of Change, The Derivative as a Function, Differentiation Formulas, Derivatives of Trigonometric Functions, Inverse Functions, Exponential Functions, Logarithmic Functions, The Chain Rule, Implicit Differentiation, Hyperbolic Functions, Indeterminate Forms and L’Hospital’s Rule  **Applications of Differentiation:** Rates of Change in the Natural and Social Sciences, Related Rates, Linear Approximations and Differentials, Maximum and Minimum Values, The Mean Value Theorem, How Derivatives Affect the Shape of a Graph, Limits at Infinity; Horizontal Asymptotes, Summary of Curve Sketching, Optimization Problems, Newton’s Method, Antiderivatives  **Integrals:** Areas and Distances, The Definite Integral, The Fundamental Theorem of Calculus, Indefinite Integrals and the Net Change Theorem | | | | | **12**  **12**  **15**  **6** | | **LO1**  **LO2**  **LO2,LO3**  **LO4,LO5** |
| **Methods of teaching and learning**  Lectures and Tutorials | | | | | | | |
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| **Assessment Method** | | | |  | | **Weight** | |
| Continuous Assessment   * Midterm Examination * Assignments/Quizzes   End Semester Examination | | | |  | | 20%  20%  60% | |
| **Recommended Reading**   * *J. Stewart, Calculus, 7th edition, (2012), Cengage Learning, ISBN-13: 978-0538497817, ISBN-10: 0538497815* * [*M. Kline*](https://www.amazon.com/Morris-Kline/e/B001H6MNLK/ref=dp_byline_cont_book_1)*, Calculus: An Intuitive and Physical Approach, 2nd edition (1998) , Dover Publications, ISBN-10: 0486404536, ISBN-13: 978-0486404530* | | | | | | | |