**MTS-111: Calculus and analytic geometry**

**General Information**

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| **Course Number** | MTS-111 |
| **Credit Hours** | 3 hours |
| **Prerequisite** | Pre-Calculus |
| **Course Coordinator** | Not Specified |

**Course Objectives**

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| The main objective is for students to learn the differential and integral calculus of a function of a single variable. Students should be able to apply single variable calculus to a variety of applications such as related rates, numerical approximation, and optimization. Students should acquire a basic conceptual understanding of limit, continuity, derivative, and integrals |

**Catalog Description**

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| MTS-111 |

**Course Content**

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| **Session No.** | **Date / Week** | Topics | **Suggested Readings** |
| 01-04 | Week 01 | Introduction to functions and graphs, tangent line problem and the area problem. | Chapter 1:  Ron Larson |
| 05-08 | Week 02 | Limit of functions, evalution of limits and the squeeze theorem |
| 09-12 | Week 03 | Continuity of function at a point,  continuity of function at interval, continuity of peciewise function and the intermediate value theorem |
| 13-16 | Week 04 | Infinite limits, derivative of a function by limit process, Introduction to derivative of a function at a point | Chapter 1and 2:  Ron Larson |
| 17-20 | Week 05 | Basic rules of differentiation |
| **1st Mid Term Exam** | | | |
| 21-24 | Week 06 | Implicit and explicit differention, related rates and extrema on interval | Chapter 3 and 4:  Ron Larson |
| 25-28 | Week 07 | Application of differentiation:  Extrema on interval |
| 29-32 | Week 08 | Increasing and decreasing functions and the first derivative test |
| 33-36 | Week 09 | Concavity and the second derivative test, introduction to limit at infinity | Chapter 4:  Ron Larson |
| 37-40 | Week 10 | Introduction to Area and sigma notation |
| 41-44 | Week 11 | The area of a plane region and , area of a region between two curves |
| **2nd Mid Term Exam** | | |
| 49-52 | Week 13 | Introduction to upper and lower sums with examples and exercise | Chapter 4  Ron Larson |
| 53-56 | Week 14 | Limits of the lower and upper sums  By using limit method  Example and exercise |
| 57-58 | Week 15 | Introduction to first fundamental theorem of calculus |
| 59-0 |  | **-Revision-** |  |
| **Final Exam** | | | |

**Text Book**

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| 1. Calculus of single variable by Larson Hostetler Edwards (9th edition) |

**Reference Material**

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| 1. Calculus by Thomas Finney 11th Edition  2. Calculus by Schaum’s outlines series  3. Calculus by James Stewart Latest edition |

**Course Learning Outcomes**

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|  | **Course Learning Outcomes (CLO)** |
| 1 | An ability to apply knowledge of derivatives using the concept of limits and continuity. |
| 2 | An ability to identify differientation problem and analyze real life applications. |
| 3 | An ability to design the solution of integration problems and area under the curves |

**CLO-SO Map**

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|  | **SO IDs** | | | | | | | | | | |
| **CLO ID** | **GA1** | **GA2** | **GA3** | **GA4** | **GA5** | **GA6** | **GA7** | **GA8** | **GA9** | **GA10** | **GA11** |
| CLO 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Approvals**

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| Prepared By | Abdul Rehman Soomro |
| Approved By |  |
| Last Update |  |