*Approved: April 2017 Effective: Fall 2017*

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| **TOPICS** | **SECTIONS FROM TEXT** | **TIME LINE** |
| Functions and Models: Four Ways to Represent a Function. Mathematical Models: A Catalog of Essential Functions. New Functions from Old Functions. Exponential Functions. Inverse Functions and Logarithms.  |   1.1 – 1.5  |   3.25 Hours  |
| Limits and Derivatives: The Tangent and Velocity Problems. The Limit of a Function. Calculating Limits Using the Limit Laws. The Precise Definition of a Limit. Continuity. Limits at Infinity; Horizontal Asymptotes. Derivatives and Rates of Change. The Derivative as a Function.  |   2.1 – 2.8  |   7 Hours  |
| Differentiation Rules: Derivatives of Polynomials and Exponential Functions. The Product and Quotient Rules. Derivatives of Trigonometric Functions. The Chain Rule. Implicit Differentiation. Derivatives of Logarithmic Functions. Rates of Change in the Natural and Social Sciences. Exponential Growth and Decay. Related Rates. Linear Approximations and Differentials. Hyperbolic Functions.  |     3.1 – 3.11  |     17 Hours  |
| Applications of Differentiation: Maximum and Minimum Values. The Mean Value Theorem. How Derivatives Affect the Shape of a Graph. Indeterminate Forms and l’Hospital’s Rule. Summary of Curve Sketching. Graphing with Calculus and Calculators. Optimization Problems. Newton’s Method. Antiderivatives.  |    4.1 - 4.9  |    12 Hours  |
| Integration: Areas and Distances. The Definite Integral. The Fundamental Theorem of Calculus. Indefinite Integrals and the Net Change Theorem. The Substitution Rule. The logarithm defined as an integral.  |  5.1 - 5.5 Appendix A.G  |   11 Hours  |
| Integration by parts.  | 7.1  | 2 Hours  |
| Total time:  |   | 52.25 Hrs  |

### 4-unit class: hours total 57.5 (15 x 3 hours 50 minutes) – hours for exams + 2.5 hour final

This outline allows for 4 hours of exams.

**NOTES:**

1. It is expected that a student leaving this course will have had experience with a computer algebra system. A minimum of two computer assignments is needed.
2. At least 25% of the grade should be based on student performance without the aid of a graphing calculator or computer.
3. Chapters 4 and 5 are extremely important in Math 181. Instructors need to spend sufficient time on these sections.
4. Practice exams can indicate types of problems but actual problems should be substantially different.

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Math Department Policy can be found at: <https://www.mtsac.edu/math/departmentpolicy.html>