**MATH 180 + MATH 18A OUTLINE**

**CALCULUS AND ANALYTIC GEOMETRY with SUPPORT**

TEXT: Calculus, Early Transcendentals, 8th Edition by Stewart

*Approved: November 2023 Effective: Fall 2024*

|  |  |  |
| --- | --- | --- |
| Materials to be covered | 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.  **Math 18A Support Topics:** Additional support for 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 | Math 180  3.25 hours  Math 18A  2 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.  **Math 18A Support Topics:** Additional support for 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 | Math 180  7 hours  Math 18A  4 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.  **Math 18A Support Topics:** Additional support for 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 | Math 180  17 hours  Math 18A  7 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.  **Math 18A Support Topics:** Additional support for 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 | Math 180  12 hours  Math 18A  7 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.  **Math 18A Support Topics:** Additional support for 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 | Math 180  11 hours  Math 18A  3 hours |
| Integration by parts.  **Math 18A Support Topics:** Additional support for Integration by parts.  **Math 18A Practice and Review of Critical Skills:** Overview of course topics in preparation for the final exam. | 7.1 | Math 180  2 hours  Math 18A  3.125 hours |
| Total time: |  | Math 180  52.25 hours  Math 18A  26.125 hours |

**All hours listed are face-time; i.e. breaks are administered by the instructor separately**

**and are in addition to the hours listed.**

**Math 180 (4 units): 57.5 hours + 2.5-hour final exam = 60 hours (a portion of these hours is testing)**

**Math 18A (2 units): 30 hours**

### **Math 18A: The outline does not include time for exams. Exams in the support course are at the**

### **discretion of the professor.**

### **Math 18A is a 15-week course. The corequisite course does not meet during finals week.**

**Math 180 Notes:**

* This course is a prerequisite for Math 181 (Calculus II) and, consequently, it is important that

the students develop sufficient skills and background to increase their chance of success in calculus II.

**Math 18A Notes:**

* Math 18A is a Pass/No Pass course and is not subject to department grading policy.

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.

Submitted by: Griffith, Guth, Khoddam, Kojima, Nguyen, Tran

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