*Approved: March 2019 Effective: Summer 2019*

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| **TOPICS** | **SECTIONS FROM TEXT** | **TIME LINE** |
| VECTORS AND THE GEOMETRY OF SPACE  Three-Dimensional Coordinate Systems. Vectors. The Dot Product. The Cross Product. Equations of Lines and Planes. Cylinders and Quadric Surfaces. | 12.1 – 12.6 | 8 hours |
| VECTOR FUNCTIONS  Vector Functions and Space Curves. Derivatives and Integrals of Vector Functions. Arc Length and Curvature. Motion in Space: Velocity and Acceleration. | 13.1 – 13.4 | 8 hours |
| PARTIAL DERIVATIVES  Functions of Several Variables. Limits and Continuity. Partial Derivatives. Tangent Planes and Linear Approximations. The Chain Rule. Directional Derivatives and the Gradient Vector. Maximum and Minimum Values. Lagrange Multipliers. | 14.1 – 14.8 | 15 hours |
| MULTIPLE INTEGRALS  Double Integrals over Rectangles. Double Integrals over General Regions. Double Integrals in Polar Coordinates. Applications of Double Integrals. Surface Area. Triple Integrals. Triple Integrals in Cylindrical Coordinates. Triple Integrals in Spherical Coordinates. Change of Variables in Multiple Integrals. | 15.1 – 15.9 | 15 hours |
| VECTOR CALCULUS  Vector Fields. Line Integrals. The Fundamental Theorem for Line Integrals. Green's Theorem. Curl and Divergence. Parametric Surfaces and Their Areas. Surface Integrals. Stokes’ Theorem. The Divergence Theorem. | 16.1 – 16.9 | 15 hours |

### 5-unit class: hours total 72.5 (15 x 4 hours 50 minutes) – hours for exams + 2.5 hour final

This outline allows for 5 hours of exams.

**NOTES:**

1. A student leaving this course will have experience with a computer algebra system. A minimum of two computer assignments is required.

2. At least 25% of students’ grades should be based on student performance without the aid of a graphing calculator or computer.

3. 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>