MATH 260 – CALCULUS AND ANALYTIC GEOMETRY III

1. **Course Description**:
   - This third course in a three-semester calculus sequence covers vectors in two- and three-dimensional space, quadratic surfaces, vector-valued functions of several variables, partial differentiation and multiple integration, vector fields, line integrals, and conservative fields. The course is designed for mathematics, science, and engineering majors.
2. **Topics Covered**
   - Vectors in the plane and three-dimensional space
     - Basic properties of vectors
     - Dot, cross, and triple products of vectors
     - Equations of lines and planes in three-dimensional space.
   - Vector-valued functions
     - Limits, continuity
     - Differentiation and integration with applications to velocity and acceleration
     - Tangent, normal, binormal local coordinate system
     - Arc length and curvature.
   - Functions of several variables
     - Real-valued functions of several variables, contour lines, and level surfaces
     - Quadratic surfaces
     - Limits and continuity
     - Partial differentiation and differentials; chain rule
     - Directional derivatives and gradient
     - Local and global extrema; Lagrange multipliers
     - Optimization problems.
   - Multiple integration
     - Evaluation of double and triple integrals; Fubini's Theorem
     - Applications of double and triple integrals, such as calculations of volume, area, center of mass
     - Triple integrals in cylindrical and spherical coordinates
     - Change of Variables Theorem in multiple integrals; Jacobian.
   - Vector fields
     - Direction fields; curl and divergence
     - Conservative fields and potential function
     - Line integrals and Green's Theorem
     - Surface integrals, including integrals involving parametrically defined surfaces
     - Stokes's and divergence theorems.
   - Using graphing technology to analyze topics
     - Graphical manner
     - Numerical manner
     - Tabular manner.
3. **What to expect?**

- **Time: The most common term lengths are listed below; others would be proportionate. Outside of class time is studying, completing homework, reviewing, etc.**

Length of term	In-class time	Out-of-class time (typical)	Total hours/wk (typical)	Total Term hours (typical)
17 weeks	5 hrs/wk	7 hrs/wk	12	204
8 weeks	11 hrs/wk	14.5 hrs/wk	25.5	204
6 weeks	14	20	34	204

- Technology: Graphing technology is used.
- Grading: Students who earn a grade of C or higher in Math 260 will pass the course.

4. Who should enroll?

- This Calculus course is recommended for any student who majors in STEM and has completed Math 155 (Calculus II) with a grade of C or better.

5. What prior knowledge students need to know to be successful?

- Limits
- Differentiation
- Optimization
- Integration and Fundamental Theorem of Calculus
- Parametric Equations and Polar Equations