MATH 155 - CALCULUS AND ANALYTIC GEOMETRY II

1. **Course Description**
   - This second course in a three-semester calculus sequence covers advanced integration techniques, improper integrals, infinite series, conic sections, parametric equations, and polar coordinates. The course is designed for mathematics, science, and engineering majors.
2. **Topics Covered**
   - Applications of integration
     - Area between curves
     - Volume of a solid of revolution
     - Arc length.
   - Techniques of integration
     - Substitution, integration by parts
     - Trigonometric integrals
     - Integration by trigonometric substitution
     - Integration by partial fractions
     - Numerical integration; trapezoidal and Simpson's Rule
     - Improper integrals.
   - Sequences and series
     - Polynomial approximation and Taylor's theorem
     - Convergence of sequences
     - Properties of infinite series
     - Integral test, nth term test
     - P-series test, comparison tests
     - Ratio and root tests
     - Alternating series test
     - Absolute convergence
     - Interval of convergence of power series
     - Differentiation and integration of power series
     - Power series representations of functions
     - Taylor series.
   - Conic sections
     - Parabolas, ellipses
     - Hyperbolas, general second degree equation.
   - Plane curves, parametric equations, and polar coordinates
     - Graphs of plane curves
     - Parametric form of the derivative
     - Arc length in parametric form
     - Graphs of polar equations
     - Area and arc length in polar coordinates.
   - Differential equations
     - Separation of variables
     - General and particular solutions
     - Initial-value problems.
   - 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	4 hrs/wk	8 hrs/wk	12	204
6 weeks	11.3 hrs/wk	22.7 hrs/wk	34	204

   - Technology: Graphing technology is required. The TI-84CE is recommended.
   - Grading: Students who earn a grade of C or higher in Math 155 will pass this course and can take the next Math class that they need for their major.
4. **Who should enroll**?
   - This Calculus course is recommended for any student who majors in STEM. Students who are eligible to enroll in MATH 155, Calculus and Analytic Geometry II can enroll in this class.
5. **What prior knowledge students need to know to be successful?**
   - Solving Equations – quadratic, rational, radical, exponential, logarithmic, polynomial, trigonometric
   - Inequalities and Interval Notation
   - Rational Expressions – factoring, simplifying, long division, completing the square, rationalizing numerators, and partial fraction decomposition
   - Relations and Functions- definitions, evaluating, domain and range
   - Trigonometric Identities – the ability to rewrite and algebraically manipulate trigonometric expressions
   - Evaluating Limits – using limit properties, algebraic techniques, and/or trigonometric identities
   - Differentiation of Explicit and Implicit Expressions, Relations, and Functions – polynomial, rational, trigonometric, exponential, logarithmic, and inverse trigonometric
   - Finding Indefinite, and Evaluating Definite Integrals – involving polynomial, rational, trigonometric, exponential, logarithmic, and inverse trigonometric expressions, relations, and functions using basic integration properties, and/or the change of variables (substitution) technique