MATH 150 – CALCULUS AND ANALYTIC GEOMETRY I

1. **Course Description**:
   o This course is the first in a three-semester calculus sequence designed for mathematics, science, and engineering majors. Topics include limits and- continuity; differentiation of algebraic, trigonometric, and exponential functions and their inverses; integration and the fundamental theorem of calculus; and applications of differentiation and integration. Concepts are covered with the expectation that students are preparing to take Calculus II and beyond.

2. **Topics Covered**
   o Limits and continuity
   ● Definition of a limit and computation of limits using numerical, graphical and algebraic approaches
   ● Theorems about limits
   ● Continuity of a function at a point and on an interval
   ● Intermediate Value Theorem.
   o Derivatives
   ● Derivative as a limit and differentiability of a function
   ● Interpretation of derivative as a slope of a tangent line and as a rate of change
   ● Differentiation formulas: power rule, product rule, quotient rule
   ● Chain rule
   ● Derivatives of trigonometric functions
   ● Higher order derivatives
   ● Implicit differentiation
   ● Related rates
   ● Tangent line approximation and differential.
   o Applications of derivatives
   ● Maximum and minimum; optimization
   ● Mean Value Theorem
   ● Concavity and inflection points
   ● Graphing functions using first and second derivatives, concavity, and asymptotes.
   ● Indeterminate forms and L'Hôpital's Rule.
   o Integrals
   ● Indefinite integrals and their properties
   ● Definite integrals as Riemann sums
   ● Special properties of definite integrals
   ● Fundamental Theorem of Calculus
   ● Integration by substitution
   o Inverse functions
   ● Differentiation of inverse functions
   ● Exponential and logarithmic functions
   ● Inverse trigonometric functions.
   o 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	10 hrs/wk	15	255
8 weeks	10.7 hrs/wk	21.4 hrs/wk	32.1	255

- Technology: A graphing calculator is required, and a Ti-84CE is recommended. Graphing technology is used regularly.
- Grading: Students who earn a grade of C or higher in Math 150 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 150, Calculus and Analytic Geometry I 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
- Relations and Functions- definitions, evaluating, domain and range
- Trigonometric Identities – the ability to rewrite and algebraically manipulate trigonometric expressions