M 171Q Calculus I

F,S,Su 4 cr. LEC 4

PREREQUISITE: M151, ACT 27 or better, SAT 620 or better, MPLEX level 5 within the past 12 months. -- Functions, elementary transcendental functions, limits and continuity, differentiation, applications of the derivative, curve sketching, and integration theory.

Course Learning Outcomes

Upon completion of this course, a student will be able to:

- Explain the definition of limit, how to compute it in elementary cases, and how to determine the limits of transcendental, rational and piecewise defined functions;
- Define infinite limits, limits at infinity, asymptotes, indeterminate forms and how to use L'Hopital's Rule;
- Explain the limit definition of continuity;
- Explain the limit definition of the derivative of a function, how it related to the function itself, and how to use it to compute derivatives;
- Use derivatives to find tangent lines to curves and velocity for particle motion;
- Apply the power, sum, product, quotient and chain rules of differentiation;
- Use the derivatives of exponential, logarithmic, trigonometric and hyperbolic functions;
- Explain implicit and logarithmic differentiation;
- Apply the Intermediate and Mean Value Theorems;
- Graphically analyze functions including using continuity and differentiation to determine local and global extrema, concavity, and inflection points;
- Use the derivative to solve challenging related rate and optimization word problems;
- Explain Newton's Method for estimating zeros of a function;
- Explain the Riemann integral, areas under graphs, antiderivatives the Fundamental Theorem of Calculus;
- Apply integration using the method of substitution

Students completing a Core 2.0 Quantitative Reasoning (Q) course should demonstrate an ability to:

- Interpret and draw inferences from mathematical models such as formulas, graphs, diagrams or tables.
- Represent mathematical information numerically, symbolically and visually.
- Employ quantitative methods in symbolic systems such as, arithmetic, algebra, or geometry to solve problems.