Course Intended Outcomes Form

Course Number: MAC 2241
Course Title: Calculus for the Life Sciences
Initiator(s) of Course Intended Outcomes: Brooke Quinlan
Date: 8/10/09
Signature(s): 
Cluster 3 - Math
Date of Cluster Approval: 8/20/09
Typed Name and Signature of Cluster Chair: Kathryn Pantelis

Course Outcomes:

Upon completion of the course the student should be able to show the use and application of mathematics in several widely diverse topics to be chosen from, but not limited to, the following:

1. Limits
   a. Find limits, one sided limits, limits at infinity, and infinite limits algebraically, numerically, and graphically.
   b. Define and determine the continuity of a function at a number, continuity of a composite function, and continuity on an interval.

2. Derivatives
   a. Find derivatives by evaluating the limit of the difference quotient.
   b. Find the slope and equation of the tangent line.
   c. Find derivatives of algebraic, trigonometric, exponential, and logarithmic functions using the power rule, the constant multiple rule, the sum rule, the product rule, the quotient rule, and the chain rule.
   d. Use derivatives to find average and instantaneous rates of change.
   e. Find higher order derivatives.
   f. Use first and second derivatives to sketch the graph of algebraic functions by finding:
      - Critical points
      - Intervals where the function is increasing and decreasing
      - Relative extrema
      - Intervals where the function is concave up and concave down
      - Inflection points
      - Asymptotes using limits
   g. Find absolute extrema on closed intervals.
   h. Use the Second Derivative Test for relative extrema.
   i. Find differentials of functions and use differentials for linear approximation.
   j. Differentiate implicitly and find related rates.

3. Integrals
   a. Find integrals of algebraic, trigonometric, exponential, and logarithmic functions without using integral tables.
   b. Understand the Fundamental Theorem of Calculus.
   c. Evaluate definite integrals and use definite integrals to find the area under a curve and the area between curves.
   d. Find the volumes of solids of revolution using the disk method.
   e. Integrate by parts.

4. Applications
   a. Use derivatives to solve optimization problems.
   b. Use differentials to approximate changes in real-life models.
   c. Find the rate of change of exponential and logarithmic functions used as mathematical models, particularly exponential growth and decay and logistic growth functions.