



## MAC 2241 Life Science Calculus

Course Description: Introductory course in calculus for the Life Sciences. Students will learn Plane Trigonometry, Vectors and Vector Operation, Algebraic and Transcendental Functions, Differential and Integral Calculus, Matrices, and Elementary Statistics with an emphasis in the application of these topics to the life sciences. (3-hour lecture)

Course Competency	Learning Outcomes
<p><b>Competency 1:</b> The student will demonstrate knowledge of trigonometric functions and their properties by:</p> <ol style="list-style-type: none"> <li>1. Finding the exact values of the angles whose reference angle is a special angle.</li> <li>2. Graphing the trigonometric functions and their various transformations.</li> <li>3. Using technology to find the values of general angles.</li> <li>4. Expressing angle measure in degrees and radians.</li> </ol>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> </ul>
<p><b>Competency 2:</b> The student will demonstrate knowledge of inverse trigonometric functions by:</p> <ol style="list-style-type: none"> <li>1. Defining the six inverse trigonometric functions, their domains, and their ranges.</li> <li>2. Graphing the six inverse trigonometric functions.</li> <li>3. Applying trigonometric functions to periodic motion and periodic phenomena.</li> </ol>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> </ul>
<p><b>Competency 3:</b> The student will demonstrate knowledge of trigonometric identities by:</p> <ol style="list-style-type: none"> <li>1. Simplifying trigonometric expressions.</li> <li>2. Using the half and double angle formulas to compute trigonometric functions.</li> <li>3. Proving basic trigonometric identities.</li> <li>4. Using the trigonometric functions of sum and differences of angles.</li> </ol>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> </ul>
<p><b>Course Competency 4:</b> The student will demonstrate knowledge of solving trigonometric equations by:</p>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> </ul>

<ol style="list-style-type: none"> <li>1. Finding solutions of trigonometric equations on the interval <math>[0, 2\pi)</math>.</li> <li>2. Finding all solutions of trigonometric equations over <math>\mathbb{R}</math>.</li> <li>3. Using trigonometric identities to solve equations.</li> </ol>	
<p><b>Course Competency 5:</b> The student will demonstrate knowledge of geometric vectors by:</p>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> <li>• Critical thinking</li> </ul>
<ol style="list-style-type: none"> <li>1. Computing the norm, sum, difference and scalar multiplication operations on vectors.</li> <li>2. Resolving vectors into components.</li> <li>3. Solving problems applied to the life sciences.</li> </ol>	
<p><b>Course Competency 6:</b> The student will demonstrate knowledge of algebraic, logarithmic, and exponential functions by:</p>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> <li>• Critical thinking</li> </ul>
<ol style="list-style-type: none"> <li>1. Defining algebraic, exponential and logarithmic functions.</li> <li>2. Graphing algebraic, logarithmic, and exponential functions and their transformations.</li> <li>3. Identifying the appropriate domains and ranges of algebraic, logarithmic, and transcendental functions.</li> <li>4. Simplifying algebraic, logarithmic and exponential functions by using their properties.</li> <li>5. Solving exponential and logarithmic equations.</li> <li>6. Defining piecewise functions.</li> <li>7. Applying exponential and logarithmic functions to problems in the life sciences.</li> </ol>	
<p><b>Course Competency 7:</b> The student will demonstrate knowledge of differentiation by:</p>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> </ul>
<ol style="list-style-type: none"> <li>1. Finding the derivative of elementary functions as the limit of their rate of change.</li> <li>2. Applying the concept of differentiation to problems in the biological and physical sciences.</li> <li>3. Identifying the critical points of polynomial and transcendental functions and products of the form <math>y = xn e^{-wx}</math> ; <math>w &gt; 0</math>.</li> </ol>	
<p><b>Course Competency 8:</b> The student will demonstrate knowledge of integration by:</p>	<ul style="list-style-type: none"> <li>• Numbers / Data</li> <li>• Critical thinking</li> </ul>

<ol style="list-style-type: none"> <li>1. Determining the antiderivative of polynomial, exponential, and trigonometric functions.</li> <li>2. Evaluating definite integrals by applying the Fundamental Theorem of Calculus.</li> <li>3. Applying integration to problems in the life and physical sciences.</li> </ol>	
<p><b>Course Competency 9:</b> The student will demonstrate knowledge of basic statistics and matrix computations by:</p>	
<ol style="list-style-type: none"> <li>1. Determining the mean, median and mode of data.</li> <li>2. Using the standard deviation to solve problems involving normal distributions.</li> <li>3. Computing measures of central tendency.</li> <li>4. Compute sums, differences, and products of matrices.</li> <li>5. Applying statistical techniques to analyze data in the life sciences.</li> </ol>	