



<b>Course Number</b> <b>Course Name</b>	Math 2530 Calculus III
<b>Credit Value</b> <b>(Breakdown of theory and lab credits)</b>	4 Theory
<b>Catalog Course Description</b>	Continuation of Calculus II including multivariate and vector calculus, level curves and surfaces, partial derivatives, gradient, directional derivatives, tangent planes, optimization, multiple integrals in Cartesian, cylindrical and spherical coordinate systems. Prerequisite: MATH 1520. (4, 4T+0L)
<b>Student Learning Outcomes/Objectives /Competencies of the Course</b>	<p><b>Student Learning Outcomes:</b> At the end of this course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Vectors in 3-dimensional space                         <ol style="list-style-type: none"> <li>a. Use vector notation correctly.</li> <li>b. Perform vector operations, including dot product, cross product, differentiation and integration, and demonstrate their geometric interpretations.</li> <li>c. Perform operations on vector valued functions and functions of a parameter.</li> </ol> </li> <li>2. Functions of multiple variables                         <ol style="list-style-type: none"> <li>a. Identify and graph the equations of cylinders and quadratic surfaces in 3-dimensional space.</li> <li>b. Determine the domain of continuity of a vector valued function and of a function of multiple variables.</li> </ol> </li> <li>3. Applications of differentiation                         <ol style="list-style-type: none"> <li>a. Compute partial derivatives, generally and at a point, and sketch their graphical representation on a surface in space.</li> <li>b. Recognize when the chain rule is needed when differentiating functions of multiple variables, parametric equations and vector valued functions, and be able to use the chain rule in these situations.</li> <li>c. Compute curvature of a parameterized vector representation of a curve in 2- and 3-dimensional space and be able to explain its meaning.</li> <li>d. Compute the unit tangent and unit normal vectors to a curve and be able to sketch them with the curve.</li> <li>e. Computationally move among position vector, velocity vector, speed, and acceleration vectors; recognize and demonstrate their use as applied to motion in space.</li> <li>f. Determine the equation of the tangent plane to a surface at a point.</li> <li>g. Use the tangent plane to a surface to approximate values on the surface and estimate error in approximation using differentials.</li> <li>h. Compute directional derivatives and represent them graphically relative to the inherent surface.</li> <li>i. Compute the gradient vector; represent it graphically relative to the inherent surface and use it to maximize or minimize rate of change of the function.</li> </ol> </li> </ol>



	<ul style="list-style-type: none"> <li>j. Locate local and global maxima and minima of a function.</li> <li>k. Use Lagrange multipliers to maximize output with one or two constraints.</li> </ul> <p>4. Applications of Integration</p> <ul style="list-style-type: none"> <li>a. Compute arc length and be able to explain its derivation as a limit.</li> <li>b. Calculate double and triple integrals independently and with their geometric representations as surfaces, areas and volumes.</li> <li>c. Calculate iterated integrals in polar, cylindrical and spherical coordinate systems.</li> </ul>
<p><b>College-Wide Student Learning Outcomes</b></p>	<p>Math 2530 learning objectives align with the following NNMC College Wide Goal:</p> <p><i>Critical thought: Students are required to analyze and synthesize information and draw reasoned conclusions.</i></p>