

(Updated Spring 2025)

PREREQUISITES:	MA1008 LE College Algebra or MA1024 LE Algebra and Trigonometry														
CATALOG DESCRIPTION:	Introduction to calculus and its application to the solution of problems arising in business, economics, and related fields. Differentiation, Marginal analysis, Integration, Optimization, Partial differentiation, Lagrange multipliers.														
RATIONALE:	The course introduces the basic concepts of differentiation and integration for polynomial, rational, exponential, and logarithmic functions involving one or two variables. Students have the opportunity to analyze the behaviors of functions regarding rates of change, solve marginal analysis and optimization problems, evaluate definite and indefinite integrals, find and evaluate partial derivatives to solve constrained and unconstrained optimization problems with functions of two variables.														
LEARNING OUTCOMES:	<p>As a result of taking this course, the student should be able to:</p> <ol style="list-style-type: none"> 1. Show understanding of the concept of the derivative of a univariate function as a rate of change and calculate the first and second order derivatives. 2. Apply direct or implicit differentiation to solve marginal analysis problems and to optimize functions arising in economics, business, and related fields. 3. Apply indefinite and/or definite integration to solve problems related to applications in economics, business, and related fields. 4. Show understanding of the concept of a function of two variables and calculate the first and second order partial derivatives. 5. Solve optimization problems involving functions of two variables. 														
METHOD OF TEACHING AND LEARNING:	<p>In congruence with the teaching and learning strategy of the college, the following tools are used:</p> <ul style="list-style-type: none"> • Lectures and class discussions. • Homework assignments. • Office hours held by the instructor to provide further assistance to students. • Use of library facilities for further study and preparation for the exams. • Use of the Blackboard course management platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, formative quizzes and online submission of assignments. <p>➤</p>														
ASSESSMENT:	<p>Summative:</p> <table border="1" data-bbox="619 1626 1458 1845"> <tr> <td data-bbox="619 1626 975 1688">First assessment: Midterm examination</td> <td data-bbox="975 1626 1066 1688">40%</td> <td data-bbox="1066 1626 1458 1688">Solving calculus problems, interpretation of results.</td> </tr> <tr> <td data-bbox="619 1688 975 1783">Second assessment: Portfolio of student work</td> <td data-bbox="975 1688 1066 1783">10%</td> <td data-bbox="1066 1688 1458 1783">Problem solving using software to promote critical thinking in applications of calculus.</td> </tr> <tr> <td data-bbox="619 1783 975 1845">Final assessment: Final examination</td> <td data-bbox="975 1783 1066 1845">50%</td> <td data-bbox="1066 1783 1458 1845">Solving calculus problems, interpretation of results.</td> </tr> </table> <p>Formative:</p> <table border="1" data-bbox="619 1935 1458 2029"> <tr> <td data-bbox="619 1935 975 2029">Practice sets of exercises and word-problems assigned through Blackboard</td> <td data-bbox="975 1935 1066 2029">0%</td> <td data-bbox="1066 1935 1458 2029">Solving calculus problems, interpretation of results.</td> </tr> </table>			First assessment: Midterm examination	40%	Solving calculus problems, interpretation of results.	Second assessment: Portfolio of student work	10%	Problem solving using software to promote critical thinking in applications of calculus.	Final assessment: Final examination	50%	Solving calculus problems, interpretation of results.	Practice sets of exercises and word-problems assigned through Blackboard	0%	Solving calculus problems, interpretation of results.
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Second assessment: Portfolio of student work	10%	Problem solving using software to promote critical thinking in applications of calculus.													
Final assessment: Final examination	50%	Solving calculus problems, interpretation of results.													
Practice sets of exercises and word-problems assigned through Blackboard	0%	Solving calculus problems, interpretation of results.													

	<p>The formative practice sets aim to prepare students for the examinations and ensure that students are actively engaged during the term.</p> <p>The first assessment (midterm exam) tests Learning Outcomes 1 and 2. The second assessment (portfolio) tests Learning Outcomes 1, 2, 3, 4, 5. The final assessment (final exam) tests Learning Outcomes 1, 2, 3, 4, 5.</p> <p>The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. If students pass the comprehensive assessment that tests all Learning Outcomes for this module and the average grade for the module is 40 or higher, students are not required to resit any failed assessments. Students are required to resit failed assessments in this module.</p>
<p>INDICATIVE READING:</p>	<p>REQUIRED READING:</p> <p>Soo T. Tan, <i>Applied Calculus for the Managerial, Life, and Social Sciences: A brief approach</i>, 10th Edition (2015), Cengage</p> <p>RECOMMENDED READING:</p> <ul style="list-style-type: none"> • Hoffmann L., Bradley G., Sobecki D., and Price M., <i>Calculus for Business, Economics and the Social and Life Sciences</i>, 11th Brief Edition (2013), McGraw Hill. • Ron Larson, <i>Applied Calculus for the Life and Social Sciences</i>, 1st Edition (2010), Cengage
<p>INDICATIVE MATERIAL:</p>	<p>REQUIRED MATERIAL: N/A</p> <p>RECOMMENDED MATERIAL: College Mathematics Mathematics Magazine American Mathematical Monthly</p>
<p>COMMUNICATION REQUIREMENTS:</p>	<p>Oral and written communication skills using academic / professional English.</p>
<p>SOFTWARE REQUIREMENTS:</p>	<p>Software associated with the course textbook's digital learning resources. Opensource programming language Python.</p>
<p>WWW RESOURCES:</p>	<p>http://mathworld.wolfram.com http://mathacademy.com https://www.khanacademy.org/math https://www.scilab.org https://www.python.org</p>
<p>INDICATIVE CONTENT:</p>	<ol style="list-style-type: none"> 1. Graphs, and Limits <ol style="list-style-type: none"> 1.1. Functions 1.2. The graph of a function 1.3. Linear functions 2. Differentiation: Basic Rules <ol style="list-style-type: none"> 2.1. Introduction of the derivative as a limit 2.2. Rules of differentiation 2.3. Higher-order derivatives 2.4. The chain rule 2.5. Marginal analysis and approximations using increments 2.6. Implicit differentiation and related rates 3. Additional Applications of the Derivative <ol style="list-style-type: none"> 3.1. Increasing and decreasing functions; relative extrema 3.2. Concavity, points of inflection, and curve sketching 3.3. Optimizing functions of one variable

4. Exponential and Logarithmic Functions

4.1. Differentiation of exponential and logarithmic functions

5. Integration

5.1. Antidifferentiation: The indefinite integral

5.2. Integration by substitution

5.3. The definite integral and the fundamental theorem of calculus

5.4. Applying definite integration: Area between curves and average value

5.5. Additional applications to business and economics

6. Calculus of Several Variables

6.1. Functions of several variables

6.2. Partial derivatives

6.3. Optimizing functions of two variables

6.4. Constrained optimization: The method of Lagrange multipliers