Capital Community College
Course Outline
Applied Calculus

SECTION I

SUBJECT AREA & COURSE NUMBER: MAT* G230
COURSE TITLE: Applied Calculus

COURSE CATALOG DESCRIPTION: Course in selected topics from calculus with applications in business, economics and social science. This course is intended for students pursuing degrees in social and behavioral sciences, business and management. Topics include linear and non-linear functions, limits, derivatives and integrals. This course requires the use of a graphing calculator (preferably TI-83+).

LECTURE HOURS PER WEEK: 3 **CREDIT HOURS:** 3
PREREQUISITE(S): MAT* G137

SECTION II

A. SCOPE:
The objective of Applied Calculus is to enable the student to model and solve a variety of problems in business, economics and social science using applications of calculus on linear and non-linear functions. Students will: (1) examine linear and non-linear functions numerically, algebraically, and graphically. (2) use technology to create linear, quadratic, exponential, and logarithmic regression curves to model and solve problems. (3) evaluate limits numerically, algebraically and graphically. (4) find the average rate of change, derivative, and definite and indefinite integrals of functions. (5) interpret the average and instantaneous rate of change, derivative and integral of functions in the context of real world situations.

B. REQUIRED WORK: Determined by the instructor as described in the course syllabus.

C. ATTENDANCE AND PARTICIPATION: Students are expected to attend each class, arrive on time, take exams at the scheduled times, and participate in the in-class learning process. (Specific instructor policies are included in the course syllabus)

D. METHODS OF INSTRUCTION: The methods of instruction are determined by each instructor and may include but are not limited to lecture, lecture/discussion, small group collaborative learning, experiment/exploration, distance learning, student presentations, use of technologies such as audio-visual materials, computer, language laboratory, and calculator.

E. OBJECTIVE, OUTCOMES, ASSESSMENT:

The following objectives and outcomes represent the department's core requirements for student achievement.

LEARNING OBJECTIVES	LEARNING OUTCOMES	ASSESSMENT METHODS
To demonstrate an understanding of:	**Student will:**	**As measured by:**
Linear Functions	a) Evaluate linear functions both algebraically and graphically b) Formulate linear functions to model real world situations and use the functions to explore the situation c) Create regression lines to model real world situations and use the regression lines to explore the situation d) Solve linear equations algebraically and through the use of technology	Written in- class quizzes, tests, and examinations; presentations to the class; out-of-class projects, written reports; portfolios; homework assignments
Non-Linear Functions	a) Evaluate quadratic, exponential, and logarithmic functions algebraically, numerically, and graphically b) Formulate quadratic, exponential, and logarithmic functions to model real world situations and use the functions to explore the situation c) Algebraically solve quadratic equations and find the vertex of quadratic functions d) Create regression curves to model real world situations and use the regression curves to explore the situation e) Use technology to solve quadratic, exponential, and logarithmic equations	
Limits & Continuity	a) Evaluate limits algebraically, numerically, and graphically b) Identify discontinuities algebraically and graphically c) Evaluate one-sided limits and limits at infinity d) Evaluate limits that model real world situations e) Evaluate piecewise defined functions f) Interpret piecewise defined functions that model real world situations	
Rates of Change	a) Find the average rate of change of a function from its table, graph and equation b) Interpret the average rate of change in the context of a real world situation c) Recognize the average rate of change as the slope of the secant line between two points d) Find the instantaneous rate of change of a function from its table, graph and equation e) Interpret the instantaneous rate of change in the context of a real world situation f) Recognize the instantaneous rate of change as the slope of the tangent line at a point g) State the units for a rate of change	
Derivative	a) Find derivatives using the definition of the derivative, differentiation theorems, and technology b) Interpret the derivative in the context of real world problems c) Interpret the units of the derivative in the context of real world situations d) Recognize and use multiple notational forms of the derivative e) Evaluate derivatives graphically, numerically, and algebraically f) Find second derivatives algebraically and through the use of technology	

Applications of the Derivative	a) Use derivatives to solve problems within the context of marginal analysis b) Find the local and global extrema of a function from its equation and graph and interpret in the context of real world problems c) Solve optimization problems d) Apply the first and second derivative tests e) Find inflection points of a function from its equation and graph and interpret in the context of real world problems	
Integral	a) Evaluate the indefinite integral of elementary functions b) Use the Fundamental Theorem of Calculus and technology to evaluate definite integrals c) Use Reimann sums to approximate definite integrals d) Apply the substitution rule to evaluate integrals	
Applications of the Integral	a) Formulate definite and indefinite integral to model real world situations and use the integrals to explore the situation b) Use integrals to solve problems within the context of marginal analysis	

Note 1: The foregoing table of learning outcomes should not be considered exhaustive; other learning outcomes may also support the objectives. The list is not intended to limit the learning outcomes that can be used to support the objectives.
Note 2: The order in which the learning outcomes are addressed and the relative emphasis given to each will vary from instructor to instructor.
Note 3: There is no expectation that an instructor will employ all the assessment methods or any particular subset of them. Also, the particular list of assessment methods is not exhaustive. Other methods that measure the learning outcomes may be used.
Note 4: It is important to recognize that courses are not delivered in a social vacuum. Any bona fide assessment of a course must take account of out-of-class life demands on students that adversely impact academic success.

F. TEXTS AND MATERIALS: A text selected by the Mathematics Section of the Science and Mathematics Department with content and presentation that support the Learning Objectives and Outcomes given in Part E above.

G. INFORMATION TECHNOLOGY: Graphing calculator