



**COWLEY COLLEGE**  
**& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

**CALCULUS FOR BUSINESS & ECONOMICS**  
**MTH 4432 3 Credit Hours**

**Student Level:**

This course is open to students on the college level in the freshman or sophomore year.

**Prerequisite:**

A minimum grade of C in MTH 4420 or 23 ACT math score or satisfactory course placement assessment scores.

**Controlling Purpose:**

To provide students in the business, economics, management, life, and social sciences with an introduction to the calculus.

**Learner Outcomes:**

Students will be introduced to optimization, and total and average values of functions, through limits, derivatives, and integrals, and make applications to cost, revenue, profit, taxation, compound interest, supply and demand, population change, and marketing.

**Units Outcomes and Criterion Based Evaluation Key for Core Content:**

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

<b>Chapter 0: A PRECALCULUS REVIEW</b>							
Outcomes: Students will review pre calculus concepts.							
A	B	C	D	F	N		Specific Competencies Demonstrate the ability to:
						*0.1	Represent, classify, and order real numbers, use inequalities to represent sets of real numbers, solve inequalities, and use inequalities to model and solve real-life problems.
						*0.2	Find the absolute values of real numbers and understand the properties of absolute value and find the distance between two numbers on the real number line. Find the distance between two numbers on the real number line and define intervals on the real number line.
						*0.3	Find the midpoint of an interval and use intervals to model and solve real-life problems.
						*0.4	Evaluate expressions involving exponents or radicals, simplify expressions with exponents and find the domains of algebraic expressions.
						*0.5	Use special products and factorization techniques to factor polynomials. Find the domains of radical expressions. Use synthetic division to factor polynomials of degree three or more. Use the Rational Zero Theorem to find the real zeros of polynomials.
						*0.5	Add and subtract rational expressions, simplify rational expressions involving radicals and Rationalize numerators and denominators of rational expressions.

<b>Chapter 1: FUNCTIONS, GRAPHS, AND LIMITS</b> (7 Hours)							
Outcomes: Students will learn to use function applications in real-life, such as Dow Jones industrial average, break even analysis, linear depreciation, demand function and market equilibrium.							
A	B	C	D	F	N		Specific Competencies Demonstrate the ability to:
						1.1	Plot points in the Cartesian plane and find the distance between two points.
						1.2	Sketch the graph of an equation, and find the x- and y-intercepts.
						1.3	Write equations of lines and sketch the lines.
						1.4	Evaluate, simplify, and find inverse functions.

\*DENOTES OPTIONAL MATERIAL

Rev. 1/26/2006

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<b>Chapter 1: FUNCTIONS, GRAPHS, AND LIMITS</b>							(7 Hours)
Outcomes: Students will learn to use function applications in real-life, such as Dow Jones industrial average, break even analysis, linear depreciation, demand function and market equilibrium.							
A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
						1.5	Find the limit of a function.
						1.6	Discuss the continuity of a variety of functions

<b>Chapter 2: DIFFERENTIATION</b>							(8 hours)
Outcomes: Students will find limits and derivatives, and make applications to finding marginal functions.							
A	B	C	D	F	N		Specific Competencies
							<b>Demonstrate the ability to:</b>
						2.1	Find the slope of a graph and calculate derivatives using the limit definition.
						2.2	Use the Constant Rule, Power Rule, Constant Multiple Rule, and Sum and Difference Rules.
						2.3	Find rates of change: velocity, marginal profit, marginal revenue, and marginal cost.
						2.4	Use the Product and Quotient Rules, Simplify derivatives and use derivatives to answer questions about real-life situations.
						2.5	Use the Chain and General Power Rule and use the rules to differentiate algebraic functions. Write derivatives in simplified form and use them to answer questions about real-life situations.
						2.6	Calculate higher-order derivatives and derivatives using implicit differentiation.
						2.7	Find derivatives explicitly and implicitly.
						2.8	Solve related-rate problems and applications.

**Chapter 3: APPLICATIONS OF THE DERIVATIVE****(8 hours)**

Outcomes: Students will make application of derivatives to curve sketching, and maximizing cost, revenue, and profit in competitive and monopolistic markets.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
						3.1	Find the open intervals on which a function is increasing or decreasing.
						3.2	Recognize the occurrence of relative extrema of functions and use the First-Derivative Test to find the relative extrema of functions. Find absolute extrema of continuous functions on a closed interval and minimum and maximum values of real-life models and interpret the results in context.
						3.3	Determine the concavity and points of inflection of a graph.
						3.4	Solve real-life optimization problems.
						3.5	Solve business and economics optimization problems. Find the price elasticity of demand for demand functions and recognize basic business terms and formulas.
						3.6	Determine vertical and horizontal asymptotes of a graph.
						3.7	Analyze the graphs of functions and recognize the graphs of simple polynomial functions.
						3.8	Use calculus to analyze the shape of the graph of a function.

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<b>Chapter 4: EXPONENTIAL AND LOGARITHMIC FUNCTIONS</b>							(8 hours)
Outcomes: Students will explore applications in compound interest, growth and decay, and management sciences using exponential and logarithmic.							
A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
						4.1 4.2	Graph the exponential function $f(x) = a^x$ and graph the natural exponential function $f(x) = e^x$
						4.3	Calculate derivatives of exponential functions.
						4.4	Graph the logarithmic function $f(x) = \ln x$ and use it to solve exponential and logarithmic equations.
						4.5	Calculate the derivatives of logarithmic functions
						4.6	Solve exponential growth and decay applications.

<b>Chapter 5: INTEGRATION AND ITS APPLICATIONS</b>							(8 hours)
Outcomes: Students will learn to use integration applications in real life such as demand function, vertical motion, marginal propensity to consume, annuity, capital accumulation, consumer and producer surpluses and Lorenz Curve.							
A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
						5.1	Find the antiderivative F of a function – that is, $F'(x) = f(x)$
						5.2 5.3	Use the General Power Rule, Exponential Rule, and Log Rule to calculate antiderivatives.
						5.4 5.5	Evaluate definite integrals and apply the Fundamental Theorem of Calculus to find the area bounded by two graphs.
						*5.6	Use the Midpoint Rule to approximate definite integrals and use a symbolic integration utility to approximate definite integrals.
						*5.7	Use integration to find the volume of a solid of revolution.

**Chapter 6: TECHNIQUES OF INTEGRATION**

(8 hours)

Outcomes: Students will learn to use the various integration techniques in many applications in real life such as present and future value, health, consumer and producer surpluses, surveying and capitalized cost.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
						6.1	Find indefinite and definite integrals using integration by substitution.
						*6.2	Evaluate integrals by parts, by using partial fractions, and by using a table of integrals. Find the present value of future income.
						*6.3	Use partial fractions to find indefinite integrals. Use logistic growth functions to model real-life situations.
						*6.4	Use integration tables, reduction formulas, and complete the square to find indefinite integrals.
						*6.5	Use the Trapezoidal Rule and Simpson's Rule to approximate definite integrals.
						*6.6	Evaluate improper integrals with infinite limits of integration and with infinite integrands.

**Projects Required:**

None

**Textbook:**

Contact Bookstore for current textbook.

**Materials/Equipment Required:**

This course requires that the student furnish their own TI83 or TI84 PLUS graphing calculator.

**Attendance Policy:**

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

**Grading Policy:**

The grading policy will be outlined by the instructor in the course syllabus.

**Maximum class size:**

Based on classroom occupancy

**Course Timeframe:**

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for

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approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

**Catalog Description:**

**MTH4432 - CALCULUS FOR BUSINESS AND ECONOMICS (3 hrs)**

An introduction to differentiation and integration with applications to analytic geometry, business, and economics. This course requires that the students furnish their TI-83 or TI-84 series graphing calculator. Prerequisite: Minimum grade of C in MTH4420 College Algebra, satisfactory course placement assessment scores, or 23 ACT math score.

**Refer to the following policies:**

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

**Disability Services Program:**

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.