



Cowley County Community College  
& Area Vocational Technical School

COURSE PROCEDURE FOR

**CALCULUS FOR BUSINESS &  
ECONOMICS**

MTH 4432     3 Credit Hours  
DIVISION OF GENERAL EDUCATION

**Student Level:** Freshman or sophomore

**Prerequisite:** A minimum grade of C in MTH 4420 or 23 ACT math score.

**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.

**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.

\*DENOTES OPTIONAL MATERIAL

**Chapter 0: A PRECALCULUS REVIEW**

Outcomes: Students will review pre calculus concepts.

A	B	C	D	F	N		Specific Competencies
							<b>Demonstrate the ability to:</b>
						*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.

**Chapter 1: FUNCTIONS, GRAPHS, AND LIMITS**

(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
							<b>Demonstrate the ability to:</b>
						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.
						1.5	Find the limit of a function.
						1.6	Discuss the continuity of a variety of functions

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**Chapter 2: DIFFERENTIATION** (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
							<b>Demonstrate the ability to:</b>
						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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**Chapter 4: EXPONENTIAL AND LOGARITHMIC FUNCTIONS**

(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
							<b>Demonstrate the ability to:</b>
						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.

**Chapter 5: INTEGRATION AND ITS APPLICATIONS**

(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
							<b>Demonstrate the ability to:</b>
						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.

\*DENOTES OPTIONAL MATERIAL

**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
							<b>Demonstrate the ability to:</b>
						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.

**Text Book:** Contact the Bookstore for current textbook information.

**References:** None

**Materials/Equip required:** This course requires that the student furnish their own TI-83 or TI-83 PLUS graphing calculator.

**Attendance Policy:** Students should adhere to the attendance policy discussed on the first day of class.

**Grading Policy:** Grading may vary according to the instructor.

**Max. Class Size:** 25

**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 student furnish their own TI-83 or TI-83 PLUS graphing calculator. Prerequisites: Minimum grade of C in MTH 4420 or a 23 ACT math score.

**Academic Code of Conduct:**

Cowley College is committed to instilling in its students a high level of academic integrity. Integrity in the classroom is a definite expectation. Students who compromise the integrity of the academic process are subject to disciplinary action by the college.

A violation of academic integrity includes but is not limited to:

- Plagiarism
- Cheating
- Fabrication and Falsification
- Multiple Submission

- Misuse of Academic Materials
- Complicity in Academic Dishonesty

**If a student is ever in doubt about the specific guidelines governing individual or group work with respect to a particular course or assignment, be sure to ask the instructor for clarification.**

## **XF Grade**

In accordance to the Academic Code of Conduct, an XF grade may be given to:

1. Students who are guilty of academic misconduct on tests or major assignments.
2. Students who knowingly facilitate classmates in academic misconduct on tests or major assignments (will be based upon the decision of the Appeals Committee).
3. Students who commit repeat violations of the Academic Code of Conduct on any class assignments.

**The Academic Code of Conduct will be used to define academic misconduct.**

If an instructor determines a student should receive an XF grade:

1. The instructor will meet with the student and follow the Academic Code of Conduct to ensure that the student has an initial opportunity to respond.
2. If the instructor still believes the student should receive an XF grade, the instructor will notify the Instructional Office and complete an XF form.
3. The student will then be notified of his/her right to appeal by the Appeals Committee, which will be scheduled as needed.
4. If the student chooses to appeal the X portion of the grade, the Appeals Committee will have the final authority.
5. The student will have the opportunity to remain in the class until the appeal process has been completed. Formal withdrawal from the class will not prevent the student from receiving a grade of XF.
6. A student may not withdraw from a class after receiving a grade of XF.
7. The decision of the Appeals Committee will be the final decision. The student, teacher, and advisor will be notified within 4 business days

To have the first XF grade removed from his/her transcript, the student must perform 20 hours of community service and successfully complete a course on academic honesty by the end of the following semester. The community service will be arranged through A.C.E.S. and will be completed at the discretion of the A.C.E.S. sponsor. The course will be for 1 credit hour at the student's expense with no financial aid or scholarship assistance. The Instructional Office may keep internal records that show the student received an XF grade that was later converted to an F after completion of the required community service and short course on academic honesty.

If a student receives an XF grade for a second time, that grade will remain on his/her transcript with no opportunity for removal. An XF grade cannot be erased from the Academic Fresh Start program.

## **Academic Misconduct**

### First Level Resolution

The original jurisdiction of any case involving academic misconduct shall be with the faculty member whose course the alleged misconduct occurred. If a faculty member suspects a student of an academic misconduct, he/she must inform the student without unnecessary delay of the alleged misconduct and provide the student the opportunity to respond before taking any action. Students suspected of academic misconduct, whether acknowledging involvement or not, shall be allowed to continue the course without prejudice pending disciplinary actions. If the faculty member takes no action within 10 days after informing the student, the allegations shall be considered dismissed.

The faculty member may take one or more of the following actions: alter a grade or assign a grade of "F" in the assignment, examination, or the course and/or recommend an additional sanction up to and including suspension and/or dismissal from the course. The action taken by the faculty member should be reported to their Department Chair/Director and the Instructional Office. The student so affected shall have the right of appeal through the Vice President of Academic and Student Affairs.

### Second Level Resolution

If a second offense of academic misconduct occurs during the student's academic career, this WILL result in administrative withdrawal from the institution for a period of one academic year. The student so affected shall have the right of appeal through the Vice President of Academic and Student Affairs.

### Third Level Resolution

After one academic year the affected student may re-enroll with the understanding if a violation of the Academic Code of Conduct occurs during their tenure at Cowley College the result will be permanent expulsion from the institution with no right of appeal.

(Institutional Policies: Student Affairs Council: Series 400.00: 402.00 Academic Code Of Conduct)

### Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If you have a disability which may impact your work in this class and for which you require accommodations, please contact Mark A. Richardson, the Disability Services Coordinator, located in the Nelson Student Center Room 203 in order for arrangements of needed accommodations. Phone number: Main Campus - 620-441-5557 or North Campuses - 316-554-2724.

E-mail: [richardson@cowley.edu](mailto:richardson@cowley.edu)

### Grade Change/Appeal:

If a student is dissatisfied with a course grade issued by an instructor and believes the grade issued is incorrect, the student may use the following appeal procedures:

- The student shall, within one academic semester following issuance of the grade, confer with the instructor and outline the reason(s) the student feels the grade is incorrect.
- The instructor shall advise the student of the grade change-if applicable.
- If the student is not satisfied with the results of the conference, he/she may request a Student Grade Appeal Form in the office of the Vice President of Academic and Student Affairs or the Dean of North Campuses. A review conference shall be held within the semester that the appeal is filed. The Vice President of Academic and Student Affairs, or their designee, the instructor who issued the grade, the Chairperson of the department or the Instructional Director involved or their

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designee will comprise the committee. The Vice President of Academic and Student Affairs will issue a decision and notify the student in writing within ten (10) days following the review. This decision is final.

(Institutional Policies: Academic Affairs Council: Series 200.00: 263.00 Student Appeal of Course Grade)

### **Student Code of Conduct**

Students attending Cowley College are expected to conduct themselves as responsible individuals at all times while on campus. Acts of incivility or other behavior which interferes with or detracts from the learning-centered environment are not acceptable. In addition, student actions which violate school policies or local, state, or federal laws are not tolerated and may result in dismissal from the college or other disciplinary action.

- Intoxicating Beverages and/or Illegal Drugs: No alcoholic or cereal malt beverages and/or illegal drugs shall be allowed on the campus or at school-sponsored functions.
- Tobacco: Smoking is not permitted in College facilities. This includes smokeless tobacco products.
- Dress and Appearance: Students are expected to be clean and dress within the limits of general trends of dress at this college. Additionally, dress must be in accordance with all laws pertaining to health, sanitation, and insurance.
- Classroom Expectations: Students are expected to behave in a civil and professional manner in the classroom. Instructors shall not permit the continued presence of disruptive behavior in class.
- Visitors and Children: Only students who are enrolled in classes are allowed to attend. Children and visitors must have prior approval from administration to attend class sessions. While on campus children and visitors must adhere to all school policies. All children under the age of 16 must be under direct supervision of a parent or guardian while on campus.
- Destruction of Property and/or Theft: Students are expected to respect the rights and property of other students, faculty, staff, etc.
- Student Identification Cards: All enrolled students at Cowley College are required to obtain a student ID card. Students must carry their current ID card with them at all times on campus.
- Electronic Devices: Cellular phones, pagers and other electronic devices shall not be used in a manner that causes disruption in the classroom, library or within any college-owned or college-operated facilities. This includes abuse of cellular devices with photographic capability. Utilizing these devices for the purposes of photographing test questions or other forms of academic misconduct or illegal activity is prohibited, as is photographing individuals in secured areas such as lavatories or locker rooms. Taking photographs of any individuals against their will is strictly prohibited.

(Institutional Policies: Student Affairs Council: Series 400.00: 403.00 Student Code Of Conduct)