



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

<p>CALCULUS II MTH4440 5 Credit Hours</p>

Student Level:

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

Catalog Description:

MTH4440 - CALCULUS II (5 hrs)

This course is an extension of MTH4435 Calculus I with topics to include advanced integration techniques, sequences and series, length, area, and volume. Application will include business and life, natural, and social sciences. This course requires that the students furnish their TI-83 or TI-84 series-graphing calculator.

Prerequisite:

Minimum grade of C in MTH4435 Calculus I

Controlling Purpose:

The course is designed to strengthen the student's understanding of concepts introduced in Calculus I and to prepare him for using these skills in other courses and related areas.

Learner Outcomes:

Upon completion of the course, the student will be proficient with the various techniques of differentiation and integration of plane curves, and be able to apply this knowledge to areas such as the physical sciences, higher mathematics, engineering, technology, and the computer sciences. The student will also be introduced to multi variate calculus and vectors in 2- and 3- space.

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.

UNIT 1: APPLICATIONS OF INTEGRATION						10 Clock Hours
Part 1 (Chapter 7, Sections 1-4)						
Outcomes: Upon completion of this unit the student should be able to find the area between two curves, the volume and surface area of solids of revolution, and the length of an arc.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Determine the necessary interval of integration and find the area between two curves bounded by two defined functions.
						Determine the necessary interval of integration and find the volume of a solid of revolution bounded by defined functions using the disc method (when the axis of revolution is the same as the axis of integration).
						Determine the necessary interval of integration and find the volume of a solid of revolution bounded by defined functions using the shell method (when the axis of revolution and the axis of integration are opposites).
						Determine the necessary interval of integration and find the length of the arc for a defined function.
						Determine the necessary interval of integration and find the surface area for a solid of revolution bounded by a defined function.

UNIT 2: APPLICATIONS OF INTEGRATION						9 Clock Hours
Part 2 (Chapter 7, Sections 5-7)						
Outcomes: Upon completion of this unit the student should be able to calculate certain physical applications of work, moments, centers of mass and centroids, fluid pressure, and fluid force.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Calculate work done in compressing a spring, moving an object, emptying a tank of liquid, lifting a mass, and expanding a gas.
						Explain the difference between the center of mass and the centroid.
						Find the mass, center of mass and first moments in one-dimensional and two-dimensional systems.
						Find the centroid of a plane region.
						Find the fluid force on a submerged sheet.
						Find the fluid force on a vertical surface.

UNIT 3: TECHNIQUES OF INTEGRATION						10 Clock Hours
Part 1 (Chapter 8, Sections 1-6)						
Outcomes: Upon completion of this unit the student should be able to find the antiderivative of standard elementary functions.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Review basic rules of integration.
						Find antiderivatives using integration by parts.
						Use algebraic substitutions to integrate trigonometric function, and trigonometric substitutions to integrate algebraic functions.
						Find antiderivatives using partial fraction decomposition.
						Find antiderivatives using tables of integrals and appropriate substitutions as needed.

UNIT 4: TECHNIQUES OF INTEGRATION						9 Clock Hours
Part 2 (Chapter 8, Sections 7-8)						
Outcomes: Upon completion of this unit the student should be able to find limits of indeterminate forms and analyze improper integrals.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify limits with indeterminate forms.
						Apply L'Hopital's rule to determine limits for the forms $0/0$ and $^{\infty}/^{\infty}$.
						Manipulate other indeterminate forms so that L'Hopital's rule can be used.
						Explain the difference between the convergence and divergence of an integral.
						Determine whether-or-not an integral with an unbounded interval of integration converges, and if so evaluate it.
						Determine whether-or-not an integral over an interval with discontinuities converges, and if so evaluate it.

UNIT 5: SEQUENCES & SERIES (Chapter 9)						12 Clock Hours
Outcomes: Upon completion of this unit, the student should be able to determine the properties of sequences and series.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Determine if a sequence bounded, monotonic, and convergent.
						Write series in sigma notation.
						Find partial sums of series.
						Identify geometric and p-series, and determine whether-or-not they are convergent.
						Use technology to find partial sums.
						Test various series for convergence using the comparison, integral, ratio, and root tests as appropriate.
						Test power series for properties of convergence.
						Use Taylor and Maclaurin series to approximate various function values.

UNIT 6: ANALYTIC GEOMETRY (Chapter 10; 10.6 optional)						9 Clock Hours
Outcomes: Upon completion of this unit the student should be able to use conic sections, parametric equations, and polar coordinates to analyze and solve problems.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Rewrite equations of the form $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ in the standard form of a circle, parabola, ellipse, or hyperbola as appropriate.
						Find the center, vertices, foci, asymptotes, directrices, latus rectum, and eccentricity of a conic as appropriate.
						Identify and analyze degenerate conics.
						Convert equations from rectangular to parametric form, and vice versa.
						Apply familiar formulas and techniques to applications in parametric form.
						Convert equations from rectangular to polar form, and vice versa.
						Graph polar equations.

UNIT 7: INTRODUCTION TO 2-SPACE AND 3-SPACE VECTORS**Clock Hours 16****(Chapter 11)**

Outcomes: Upon completion of this unit, the student should be able to perform elementary operations on vectors two-dimensional and three-dimensional vectors and sketch graphic representations of lines and surfaces in three-space.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Find the directions and magnitude of two-dimensional and three-dimensional vectors.
						Sketch graphic representations of two-space and three-space vectors.
						Make applications of vectors to force and navigation problems.
						Find resultants and scalar, dot, and cross products.
						Find the equations of a line in 3-space.
						Identify and sketch cylinders and quadric surfaces in three dimensions.
						Convert from rectangular to cylindrical coordinates, and vice versa.

Projects Required:

Projects may or may not be required. Any projects will be announced in class.

Text Book:

Contact the Bookstore for current textbook.

Major Equipment Required:

Graphics Calculator, TI-83 or TI-84 Plus.

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.

Quizzes will be given at least weekly and will be valued at 20 points each. There will be two (2) quizzes that will be dropped. If a student misses a quiz then it will be one of the dropped quizzes.

Exams will be comprehensive in nature. A student must sit for both exams to earn a passing grade.

The 10-point grading scale will be used for course grades.

Maximum class size:

Based on classroom occupancy

Course Time Frame:

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 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.

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.