CLOUD COUNTY COMMUNITY COLLEGE

Our Mission: Cloud County Community College prepares students to lead successful lives and enhances the vitality of our communities.

**GENERAL INFORMATION**

**Course Number and Title:** MA 120 Analytic Geometry and Calculus I

**Term and Year:**Academic Year 2022-2023

**Credit Hours**: 5

**Course Description**: This course reviews inequalities, linear equations, function notation, graphing and trigonometry. Students will study limits, continuity, derivatives, differentials, L'Hopital's Rule, and integrals. Practical applications include graphing, motion, optimization, related rates, Newton’s Method, and L’Hopital’s Rule, and area. Prerequisite: appropriate test scores or College Algebra and Trigonometry with grades of C or better.

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****Division:**** Mathematics, Science, and Technical Programs
**Department:** Mathematics and Engineering

**STUDENT LEARNING OUTCOMES AND ASSESSMENT**

**Course Learning Outcomes**

For this course, students are expected to demonstrate the skills associated with the course learning goals as described by the student learning outcomes below:

1. Using Limits

a. Evaluation of Limits

i. Use the definition of a limit to verify a value for the limit of a function

ii. Evaluate the limit of a function at a point both algebraically and graphically

iii. Evaluate the limit of a function at infinity both algebraically and graphically

b. Use of Limits

i. Use the limit to determine the continuity of a function

ii. Apply the Intermediate‐Value Theorem iii. Use the limit to determine differentiability of a function

c. Limiting Process

i. Use the limiting process to find the derivative of a function

2. Finding Derivatives

a. Find derivatives involving powers, exponents, and sums

b. Find derivatives involving products and quotients

c. Find derivatives involving the chain rule

d. Find derivatives involving exponential, logarithmic, and trigonometric functions

e. Find derivatives involving implicit differentiation

3. Using Derivatives

a. Curve Sketching

i. Use the first derivative to find critical points

ii. Apply the Mean‐Value Theorem for derivatives

iii. Determine the behavior of a function using the first derivative

iv. Use the second derivative to find inflection points

v. Determine the concavity of a function using the second derivative

vi. Sketch the graph of the function using information gathered from the first and second derivatives

vii. Interpret graphs of functions

b. Applications of Derivatives

i. Use the derivative to find velocity, acceleration, and other rates of change

ii. Use the derivative to find the equation of a line tangent to a curve at a given point

iii. Use optimization techniques in areas such as economics, the life sciences, the physical sciences, and geometry

iv. Solve related rates problems

v. Use Newton’s Method

vi. Use differentials to estimate change

4. Finding Integrals

a. Find area using Riemann sums and integrals

b. Express the limit of a Riemann sum as a definite integral

c. Evaluate the definite integral using geometry

d. Integrate algebraic, exponential, and trigonometric functions

e. Evaluate definite integrals using the Fundamental Theorem of Calculus

f. Apply the Mean‐Value Theorem for integrals g. Integrate indefinite integrals

h. Integrate using substitution

i. Approximate integrals using Simpson’s Rule and the Trapezoidal Rule

The learning outcomes detailed in this syllabus meet or exceed the learning outcomes specified by the Kansas Core Outcomes Project for this course as sanctioned by the Kansas Board of Regents to ensure transfer between Kansas colleges and universities. Systemwide Transfer (SWT) Code: MAT2010

In class, students are assessed on the mastery of these outcomes using the learning management system. Student names will not be used when reporting results. Outcomes-based assessment is used to improve the instructional planning, design, and quality of student learning throughout the college

**General Education Outcomes**

For this course, students are expected to demonstrate the skills associated with the college wide learning goals as described by the general education/program outcomes below:

GEM1. Recognize the mathematical concepts that are applicable to a scenario.

GEM2. Apply technology in analysis.

GEM3. Accurately interpret, validate, and communicate the result.

Artifacts of student work are collected from general education course and reviewed by a faculty committee to assess general education outcomes. Artifacts may also be reviewed by a professional outside the college. Student names will not be used when reviewing artifact nor reporting results. Program accomplishment is partially measured through performance on program outcomes. Outcomes-based assessment is used to improve the instructional planning, design, and quality of student learning throughout the college.

**Institutional Learning Outcomes**

For this course, students are expected to demonstrate the skills associated with the college wide learning outcomes as described below.

*Employment*

**Employment:**

ILO\_Em1. Demonstrate knowledge of norms and expectations of professional environments.

ILO\_Em2. Demonstrate skills in working with others in a professional and constructive manner.

In class, students are assessed on the mastery of these outcomes. Student names will not be used when reporting results. Outcomes-based assessment of the institutional learning outcomes is used to ensure we are meeting the mission of the college, following the guiding values and enhance instructional planning, design, and quality of student learning throughout the college.