Required Syllabus Information – all must be included in the course syllabus

MAT 125
Course Title: Survey of Calculus: MA1
Course Credits: 4
Course Description: Includes derivatives, integrals, and their applications, with attention restricted to algebraic, exponential, and logarithmic functions for business, life science and/or social science majors.

GT Pathways Requirements:

Guaranteed Transfer (GT) Pathways Course Statement:
The Colorado Commission on Higher Education has approved MAT 125 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT- MA1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html.

MATHEMATICS CONTENT CRITERIA GT-MA1

a) Demonstrate good problem-solving habits, including:
   - Estimating solutions and recognizing unreasonable results.
   - Considering a variety of approaches to a given problem, and selecting one that is appropriate.
   - Interpreting solutions correctly.
b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.
c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.
d) Apply mathematical concepts, procedures, and techniques appropriate to the course.
e) Recognize and apply patterns or mathematical structure.
f) Utilize and integrate appropriate technology.

COMPETENCIES & STUDENT LEARNING OUTCOMES FOR GT-MA1

Quantitative Literacy:

1. **Interpret Information**
   a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
2. **Represent Information**
   a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).
3. **Perform Calculations**
   a. Solve problems or equations at the appropriate course level.
   b. Use appropriate mathematical notation.

c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.

4. **Apply and Analyze Information**
    a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.
    b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.
    c. Make judgments based on mathematical analysis appropriate to the course level.
5. **Communicate Using Mathematical Forms**
    a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

SYSTEM REQUIREMENTS:

REQUIRED COURSE LEARNING OUTCOMES

1. Apply algebraic techniques in problem solving
2. Evaluate limits
3. Determine continuity
4. Apply the techniques of differentiation to algebraic, exponential and logarithmic functions
5. Analyze graphs using calculus techniques
6. Utilize the derivative to solve application problems
7. Apply the techniques of definite and indefinite integrals
8. Utilize integration to solve applications problems

REQUIRED TOPICAL OUTLINE

I. Apply algebraic techniques in problem solving
    a. Definitions and properties of exponential and logarithmic functions
    b. Linear business applications
    c. Quadratic business applications
II. Evaluate limits.
    a. Numeric evaluation of limits
    b. Graphical evaluation of limits
    c. Analytic evaluation of limits
III. Determine continuity.
    a. Definition of continuity
    b. Graphic determination of continuity
    c. Analytic determination of continuity
IV. Apply the techniques of differentiation to algebraic, exponential and logarithmic functions
    a. Calculation of the derivative from the definition
    b. Product rule

c. Quotient rule
d. Chain rule
e. Implicit differentiation
f. Derivatives of exponential and logarithmic functions
g. Tangent lines and rates of change

V. Analyze graphs using calculus techniques
a. Graphic determination of extrema
b. Increasing and decreasing intervals by the first derivative test
c. First derivative test for determining extrema
d. Second derivative test for determination of extrema
e. Determination of points of inflection
f. Determination of concavity
g. Point of diminishing returns
h. Curve sketching

VI. Utilize the derivative to solve application problems
a. Related rates
b. Application of extrema
c. Economic lot size and elasticity of demand

VII. Apply the techniques of definite and indefinite integrals
a. Introduction to the definition of a definite integral
b. Area under a curve
c. Area between two curves
d. Calculation of definite integrals
e. Calculation of indefinite integrals
f. Integration using substitution
g. Improper integrals
h. Fundamental Theorem of Calculus

VIII. Utilize integration to solve applications problems.
a. Applications specific to business, life science and/or social science

RECOMMENDED TOPICAL OUTLINE

I. Apply algebraic techniques in problem solving
a. Relations and functions

II. Apply the techniques of definite and indefinite integrals
a. Integration by parts

III. Utilize integration to solve applications problems
a. Consumer's/producer's surplus
b. Accumulated present/future value
c. Continuous money flow

CCCOnline Course Policies: http://www.ccconline.org/ccconline-course-policies/

Effective Spring 2018, 201830