ROCHESTER COMMUNITY AND TECHNICAL COLLEGE COMMON COURSE OUTLINE

Course discipline/number/title: MATH 1127: Calculus I

A. CATALOG DESCRIPTION
1. Credits: 5
2. Hours/Week: 5
3. Prerequisites (Course discipline/number): MATH 1117
4. Other requirements: An appropriate placement score is equivalent to the prerequisite. Successful completion of prerequisite course with a grade of C or higher.
5. MnTC Goals (if any): Goal 4/Mathematical/Logical Reasoning

B. COURSE DESCRIPTION: This first calculus course in the sequence include the following topics: limits; continuity; differentiability; applications of differentiation including related rates; optimization; linear approximation and Newton's Method; function sketching; integration with applications including area, volumes of rotation, and work; introduction to the calculus of inverse functions including exponential, logarithmic and trigonometric functions. College level reading skills as demonstrated by completion of READ 0900 or equivalent placement score.

C. DATE LAST REVISED (Month, year): February, 2019

D. OUTLINE OF MAJOR CONTENT AREAS:
1. Functions and Limits
2. Derivatives and Applications of Differentiation
3. Integrals and Applications of Integration
4. Calculus of Inverse Functions

E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Evaluate limits (determinate and indeterminate forms), including the introduction of the formal definition of limits using epsilon-delta.
2. Understand and demonstrate continuity concepts.
3. Evaluate derivatives using limit, differentiation formulas (including the product, quotient, and power rule), the chain rule and implicit differentiation.
4. Differentiate functions including power functions, exponential and logarithmic functions, trigonometric functions and their inverses.
5. Sketch functions stating increasing/decreasing intervals, extrema, intervals of concavity, and inflection points.
6. Solve applications of differential calculus including related rates, linear approximations, and optimization.
7. Apply the concept of differentials to approximate the change in a variable.
8. Apply Newton's Method to approximate solutions for roots of a function.
9. Evaluate integrals using Riemann sums (demonstrate inductive and deductive proofs as needed), Fundamental Theorem of Calculus, and substitution.
10. Integrate functions including power functions, exponential functions, and some trigonometric functions.
11. Solve applications using integral calculus including area and average value.
12. Calculate volumes of solids using disks, washers, shells, and by cross-sectional areas.
13. Use Calculus to solve work problems involving spring motion and fluid motion.
14. Differentiate inverse functions emphasizing the case when the inverse function cannot be written algebraically.

F. LEARNING OUTCOMES (MNTC):
Goal 4/Mathematics/Logical Reasoning: The student will be able to:
1. Illustrate historical and contemporary applications of mathematics/logical systems.
2. Clearly express mathematical/logical ideas in writing.
3. Explain what constitutes a valid mathematical/logical argument (proof).
4. Apply higher-order problem solving and/or modeling strategies.

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Exams
2. Homework

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to: Continued. . .

3. Quizzes
4. Group assignments
5. Projects

H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcomes(s): Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.

I. SPECIAL INFORMATION (if any):

1. Additional fees may be required for field trips
2. A graphing calculator is required. (Texas Instruments (TI) is recommended and supported.