LEWIS AND CLARK COMMUNITY COLLEGE
GODFREY, ILLINOIS
MATH 171 - CALCULUS AND ANALYTIC GEOMETRY I
Course Syllabus

A. COURSE DESCRIPTION

MATH 171 CALCULUS AND ANALYTIC GEOMETRY I

Presents straight lines, functions, the derivative, limits and continuity, mean value theorem, chain rule, curve sketching, implicit differentiation, related rates, applications of differentiation, antiderivatives, introduction to integration, areas by integration and numerical methods*. A graphing calculator is required for this course.*

> ***Note: For students to receive 5 credit hours through LCCC, an ACT Math Score of at least 25 (or SAT Math Score of 31) or an acceptable COMPASS Placement test score is required.***

B. LEARNING OBJECTIVES

Upon successful completion of the course, a student should be able to:

1. Prove theorems analytically.
2. Determine the equation of a straight line or circle, given sufficient conditions, and graph a curve, given its equation.
3. Analyze domain and range of functions.
4. Use function notation to describe and analyze functions.
5. Evaluate limits.
6. Determine continuity of a function.
7. Compute the derivative of a function by the limit definition.
8. Compute derivatives of algebraic, trigonometric, and transcendental functions using differentiation rules.
9. Apply derivatives to velocity, acceleration, and other related rates.
10. Find derivatives using the Chain Rule and Implicit Differentiation.
11. Determine the Relative and Absolute Extrema of a function.
12. State and apply the Mean Value Theorem.
13. Examine functions for intervals of increase and decrease and concavity and apply the results to graphing.
14. Apply differentiation techniques to optimization problems.
15. Use Newton's Method to approximate a zero of a function.
16. Compute and apply differentials.

17. Find antiderivatives of functions.
18. Perform integration by substitution.
19. Describe how a Riemann Sum approximates the area under a curve and use Riemann Sums to make such approximations.
20. Evaluate definite integrals by means of the Fundamental Theorem of Calculus.
21. Approximate definite integrals by using numerical methods.
22. Write an explanation of why a particular theorem or procedure applies or does not apply in a given situation.

C. METHODS OF LEARNING
Instructional methods in this course may include, among others, the following:

1. Lectures
2. Discussions
3. Assignments
4. Student projects

D. EVALUATION OF STUDENT ACHIEVEMENT
The methods of evaluating student achievement will include:

1. Quizzes
2. Student Presentations
3. Examinations

E. COURSE CONTENT
The following topics are to be covered during the instructional process:

1. Limits and Their Properties
a. An introduction to Limits
b. Properties of Limits
c. Techniques for evaluating Limits
d. Continuity and one-sided Limits
e. Infinite Limits
2. Differentiation
a. The derivative and the tangent line problem
b. Basic differentiation rules and rates of change
c. The product and quotient rules and higher order derivatives
d. The chain rule
e. Implicit differentiation

f. Related rates
3. Applications of Differentiation
a. Extrema on an interval
b. Rolle's Theorem and the Mean Value Theorem
c. Increasing and decreasing functions and the First Derivative Test
d. Concavity and the Second Derivative Test
e. Limits at infinity
f. A summary of curve sketching
g. Optimization problems
h. Newton's method
i. Differentials
4. Integration
a. Antiderivatives and indefinite integration
b. Area
c. Riemann sums and the definite integral
d. The Fundamental Theorem of Calculus
e. Integration by substitution
f. Numerical integration
5. Logarithmic, Exponential, and Other Transcendental Functions
a. The natural logarithmic function and differentiation
b. The natural logarithmic function and integration
c. Inverse functions
d. Exponential functions: differentiation and integration
e. Bases other than *e* and applications
f. Growth and decay
g. Inverse trigonometric functions and differentiation
h. Inverse trigonometric functions: integration and completing the square
i. Hyperbolic functions

F. NEEDED MATERIALS
You are expected to bring these to class everyday:

- Calculus book (**Calculus: Early Transcendentals)**
- Laptop
- Graphing Calculator (**TI-84 Plus CE is recommended**)
- Pencils
- 1.5 in. Binder
- Loose Leaf Filler Paper (Reinforced Preferred)
- Hole Punch Reinforcements (Optional)

Student: I have read the classroom discipline plan and syllabus, and I understand it. I will honor it to the best of my ability. Parents: My child has discussed this classroom discipline plan with me. I understand it and will support it.

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Printed Student Name

_____ _____

Student Signature / Date Parent Signature / Date