ILLINOIS EASTERN COMMUNITY COLLEGES
DUAL CREDIT COURSE SYLLABUS
Flora High School

College: Frontier Community College **Term:** Fall **Year:** 2019

IECC Course Number: MTH 1171 **Section:** ____ **Title:** Calculus and Analytic Geometry I

High School Course Number: 2009.01

High School Course Name: Calculus **Credit:** 5

Instructor Information:

Name: Rachel Webb

Office location and phone number: Flora High School **Office hours:** N/A

Class Meeting Times, Days, Locations: MTWRF 12:01 - 12:46, Room 7C Flora High School

Course Catalog Description / Prerequisites: A first course in calculus and analytic geometry. Topics include: basic techniques of differentiation and integration with applications including curve sketching, anti differentiation, the Riemann integral, the fundamental theorem of calculus, transcendental functions and applications of the definite integral. Technology will be used throughout the course. Students are strongly advised to complete this sequence at one institution. PREREQUISITE: Four years of college preparatory mathematics including geometry, trigonometry, and algebra, or MTH 1102 College Algebra and MTH 1105 Trigonometry, with grades of C or better, or consent of the instructor. Lecture.

Required Textbooks, Reference, and Other Materials:
CALCULUS. Larson. Current edition. (FCC), access to a graphing calculator

Attendance Requirements: Attendance Regular class attendance is necessary if a student is to receive maximum benefits from work. Regular attendance is the responsibility of the student. All absences and arrangements for make-up work are arranged directly with the instructor, who is responsible for determining whether the absence is excused. When the quality of work has been affected by absences or tardiness, the instructor may recommend that the student be dropped from the course. The student will be notified of the administrative withdrawal. Make up work for illness and other absences may be accepted at the discretion of the instructor

Methods of Instruction: Lecture/discussion with the primary emphasis on problem solving/group work (at the discretion of individual instructor).

Methods of Student Evaluation and Grading Scale: Methods of Student Evaluation:
The primary means of evaluating students will be their performance on tests and quizzes. Projects and papers may also be used as determined by individual instructor. Student effort as demonstrated on assignments, participation in class, and attendance also may be considered.

A semester hour is the unit used to measure credit. One semester credit hour is awarded for the successful completion of one hour per semester of lecture activity or two hours per week per semester of lab activity. While credit is awarded to recognize that the student has accomplished all course requirements, the following grades and symbols are awarded to reflect the quality of that performance.

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Flora Grading Scale

Grade	Range
A	95-100
A-	94
B+	93
B	87-92
B-	86
C+	85
C	78-84
C-	77
D+	76
D	70-75
D-	69
F	0-68

Student Learning Outcomes:
Successful completers will:
OUTCOME 1: The student will calculate with, and apply limits in several contexts.
Objectives: The student will be able to:
A. Evaluate limits symbolically, numerically and graphically.
B. Discuss and use the epsilon-delta definition of the limit.
C. Explain the relationship between limits and other concepts including continuity, derivatives, and integrals.

OUTCOME 2: The student will calculate with, and apply derivatives in several contexts.
Objectives: The student will be able to:
A. State the definition of the derivative.
B. Determine where a function is differentiable and where it is not differentiable.
C. Compute elementary derivatives using the limit definition.
D. Compute derivatives symbolically, numerically and graphically.
E. Compute derivatives using the power rule, product rule, quotient rule, chain rule and implicit differentiation.
F. Explain the relationship between a function and its derivatives in a graphical setting.
G. Find and label intervals on which a function is increasing, decreasing, concave upward or concave downward.
H. Find and label relative and absolute extrema.
I. Demonstrate the uses of differentiation in optimization applications.
J. Understand and apply Newton's Method.

OUTCOME 3: The student will calculate with, and apply integrals in several contexts.
Objectives: The student will be able to:
A. Define the definite integral using the concept of a limit.
B. Determine the antiderivative of several elementary functions.
C. Demonstrate an understanding of the Riemann Sum definition of integrals.
D. Explain the Fundamental Theorem of Calculus and its importance.

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E. Evaluate definite and indefinite integrals using antiderivatives and substitution.
F. Use appropriate approximation techniques to estimate integrals.

OUTCOME 4: The student will use integration to solve applied problems in a variety of settings.
Objectives: The student will be able to:
A. Use integrals to find the area between two curves.
B. Use integrals to find areas.
C. Use integrals to find volumes of solids of revolution.
D. Use integrals to find lengths of curves.
E. Use integrals to find the surface area of a solid of revolution.
F. Use integrals to solve applied problems involving work and centers of mass.

OUTCOME 5: Use technology to enhance their conceptual understanding of the calculus in this course through the visualization and demonstration of the topics.

OUTCOME 6: The student will read, interpret and organize information into appropriate mathematical format.

OUTCOME 7: The student will communicate effectively about mathematics.
Objectives: The student will be able to:
A. Verbally describe solutions to problems using appropriate terminology.
B. Provide complete written explanations of concepts using appropriate terminology.
1. Use appropriate vocabulary for the audience and purpose.
2. Document attainment of skills learned.
3. Demonstrate knowledge of the subject.
4. Demonstrate subject specific critical thinking skills.

OUTCOME 8: The student will develop problem-solving and mathematical modeling skills.
Objectives: The student will be able to:
A. Clarify and analyze the meanings of words, phrases and statements.
B. Learn the meanings of relevant symbols used in the discipline and ways to use them.
C. Organize and present information or data in tables, charts, and graphs.
D. Use mathematical symbol systems to raise questions about models and proposed answers to problems
E. Identify, analyze and evaluate assumptions.
F. Use mathematical symbolism to identify, state and clarify arguments or reasoning.
G. Generate and assess solutions to problems.

Detailed Course Outline: (Note: *The instructor reserves the right to modify the detailed course outline when necessary.)*
Topical Outline:

I.	Limits and Their Properties	11
	A. An introduction to limits	
	B. Properties of limits	
	C. Techniques for evaluating limits	
	D. Continuity and one-sided limits	
	E. The chain rule	
	F. Limits involving trigonometric functions	
II.	Differentiation	17
	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	

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D. Derivatives involving trigonometric functions
E. The chain rule
F. Implicit differentiation
G. Related rates

III. Applications of Differentiation 17
A. Extreme 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

IV. Integration 17
A. Antiderivatives and indefinite integration
B. Area
C. Riemann sums and definite integrals
D. The fundamental theorem of calculus
E. Integration by substitution
F. Integration involving trigonometric functions
G. Numerical integration

V. Applications of Integration 13
A. Area of a region between two curves
B. Volume: The disc and shell methods
C. Arc length and surfaces of revolution
D. Work
E. Fluid pressure and force
F. Moments, centers of mass, and centroids

Total Contact Hours: 75

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