Calculus
Syllabus
2016-2017
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Room B-3

Course Description:
This is a fourth two-semester mathematics course option for students who have completed Mathematics IV or its equivalent. It includes problem solving, reasoning and estimation, functions, derivatives, applications of the derivative, integrals, and application of the integral. (*Prerequisite: Successful completion of Mathematics IV or Accelerated Mathematics III for students who entered ninth grade in school years 2008-2009, 2009-2010, or 2010-2011 only*) Instruction and assessment should include the appropriate use of technology. Topics will be presented in multiple ways, such as verbal/written, numeric/data-based, algebraic, and graphical. Concepts will be introduced and used, where appropriate, in the context of realistic phenomena.

ALGEBRA
Students will investigate properties of functions and use algebraic manipulations to evaluate limits and differentiate functions.
MCA1. Students will demonstrate knowledge of both the definition and the graphical interpretation of limit of values of functions.
a. Use theorems and algebraic concepts in evaluating the limits of sums, products, quotients, and composition of functions.
b. Verify and estimate limits using graphical calculators.
MCA2. Students will demonstrate knowledge of both the definition and graphical interpretation of continuity of a function.
a. Evaluate limits of functions and apply properties of limits, including one-sided limits.
b. Estimate limits from graphs or tables of data.
c. Describe asymptotic behavior in terms of limits involving infinity.
d. Apply the definition of continuity to a function at a point and determine if a function is continuous over an interval.
MCA3. Students will demonstrate knowledge of differentiation using algebraic functions.
a. Use differentiation and algebraic manipulations to sketch, by hand, graphs of functions.
b. Identify maxima, minima, inflection points, and intervals where the function is increasing and decreasing.
c. Use differentiation and algebraic manipulations to solve optimization (maximum – minimum problems) in a variety of pure and applied contexts.

DERIVATIVES
Students will investigate limits, continuity, and differentiation of functions.
MCD1. Students will demonstrate an understanding of the definition of the derivative of a function at a point, and the notion of differentiability.
a. Demonstrate an understanding of the derivative of a function as the slope of the tangent line to the graph of the function.
b. Demonstrate an understanding of the interpretation of the derivative as instantaneous rate of change.
c. Use derivatives to solve a variety of problems coming from physics, chemistry, economics, etc. that involve the rate of change of a function.
d. Demonstrate an understanding of the relationship between differentiability and continuity.
e. Use derivative formulas to find the derivatives of algebraic, trigonometric, inverse trigonometric, exponential, and logarithmic functions.

MCD2. Students will apply the rules of differentiation to functions.
a. Use the Chain Rule and applications to the calculation of the derivative of a variety of composite functions.
b. Find the derivatives of relations and use implicit differentiation in a wide variety of problems from physics, chemistry, economics, etc.
c. Demonstrate an understanding of and apply Rolle's Theorem, the Mean Value Theorem.

INTEGRATION
Students will explore the concept of integration and its relationship to differentiation.
MCI1. Students will apply the rules of integration to functions.
a. Apply the definition of the integral to model problems in physics, economics, etc, obtaining results in terms of integrals.
b. Demonstrate knowledge of the Fundamental Theorem of Calculus, and use it to interpret integrals as anti-derivatives.
c. Use definite integrals in problems involving area, velocity, acceleration, and the volume of a solid.
d. Compute, by hand, the integrals of a wide variety of functions using substitution.

Textbook:
Larson, Hostetler, and Edwards. *Calculus with Analytic Geometry*. Sixth edition. Houghton Mifflin Company, 1998. A lost or damaged textbook must be replaced at a cost of $91.77.

Grading
- Daily Work 20%
- Quizzes 25%
- Tests 35%
- Benchmark 20%

Novel:
Calculus students will be reading exerts from *The Calculus Diaries* by Jennifer Ouellette.

Materials:
Each student is needs to have each of the following items:
- Pencils
- Notebook paper and graph paper
- 2-3" three ring binder
- Graphing Calculator

Classroom Rules:
- Be seated when the tardy bell rings. Tardiness=Detention!
- Be prepared for class.
- Be respectful.
- Follow directions Do NOT disrupt class

Notes
- You will be expected to take notes when going over new material. Please have pencil and paper available for each class.

Make-up Work
- Make-up work should be obtained upon returning from school. This is **your responsibility**. You have five days to complete make-up work from the day you return to school. Failure to complete make-up work will result in a "0" in the grade book.