

EVERGREEN COMMUNITY CHARTER SCHOOL CURRICULUM

MATH

Course: Calculus		
Grade: 12	Make sense of problems and persevere in solving them. Construct viable arguments and critique the reasoning of others. Use appropriate tools strategically.	Reason abstractly and quantitatively. Model with mathematics. Attend to precision.

PA Core Standards	Materials	Methods/Assessment
<ul style="list-style-type: none"> • CC.2.1.HS.F.3 Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. • CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems. • CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context. • CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. • CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs. • CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms. • CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships. • CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable. • CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method. • CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. • CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. • CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. • CC.2.2.HS.C.5 Construct and compare linear, quadratic and exponential models to solve problems. • CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. • CC.2.2.HS.C.7 Apply radian measure of an angle and the unit circle to analyze the trigonometric functions. • CC.2.2.HS.C.8 Choose trigonometric functions to model periodic phenomena and 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Resources:</p> <ul style="list-style-type: none"> • PDE SAS portal: http://www.pdesas.org • Teacher generated/differentiated instruction resources and activities • http://www.khanacademy.org/ • Calculators • Math Counts activities • Pearson Success.net <p>Differentiation:</p> <p>Enrichment</p> <ul style="list-style-type: none"> • Leveled tests and quizzes • Self-paced <p>Remediation</p> <ul style="list-style-type: none"> • One on one • Quiz & test corrections • Accommodations • Adapted assignments • Extra time • Math Support • Notecard permitted for quizzes and tests 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

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describe the properties of the graphs.

- CC.2.2.HS.C.9 Prove the Pythagorean identity and use it to calculate trigonometric ratios.
- CC.2.3.HS.A.3 Verify and apply geometric theorems as they relate to geometric figures.

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Skills	Materials/Unit Objectives	Methods/Assessment
<ul style="list-style-type: none"> • Identify mathematical information from graphical, numerical, analytical, and/or verbal representations. • Apply appropriate mathematical rules or procedures, with and without technology. • Identify an appropriate mathematical rule or procedure based on the classification of a given expression. • Confirm whether hypotheses or conditions of a selected definition, theorem, or test have been satisfied. • Identify a re-expression of mathematical information presented in a given representation. • Identify an appropriate mathematical definition, theorem, or test to apply. • Apply appropriate mathematical rules or procedures, with and without technology. • Apply an appropriate mathematical definition, theorem, or test. • Identify how mathematical characteristics or properties of functions are related in different representations. • Provide reasons or rationales for solutions or conclusions. 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Chapter 2 – Limits</p> <p>Students will understand:</p> <ul style="list-style-type: none"> • The concept of a limit can be used to understand the behavior of functions. • Continuity is a key property of functions that defined using limits. 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

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Skills	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • Calculate derivatives of compositions of differentiable functions. • Calculate derivatives of implicitly defined functions. • Determine higher order derivatives of a function. • Interpret the meaning of a derivative in context. • Calculate related rates in applied contexts. • Interpret the meaning of a derivative in context. • Calculate related rates in applied contexts. • Calculate rates of change in applied contexts. 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Chapter 3 – Derivatives</p> <p>Students will understand:</p> <ul style="list-style-type: none"> • The derivative of a function is defined as the limit of a difference quotient and can be determined using a variety of strategies. • The derivative of a function is defined as the limit of a difference quotient and can be determined using a variety of strategies. • A function’s derivative, which is itself a function, can be used to understand the behavior of the function. • The derivative has multiple interpretations and applications including those that involve instantaneous rate of change. • The Mean Value Theorem connects the behavior of a differentiable function over an interval to the behavior of the derivative of that function at a particular point in the interval. 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

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Skills	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • Approximate a value on a curve using the equation of a tangent line. • Calculate derivatives of inverse and inverse trigonometric functions. • Determine limits of functions that result in indeterminate forms. 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Chapter 4 – Applications of Derivatives</p> <p>Students will understand:</p> <ul style="list-style-type: none"> • The derivative of a function is defined as the limit of a difference quotient and can be determined using a variety of strategies. • The derivative of a function is defined as the limit of a difference quotient and can be determined using a variety of strategies. • A function’s derivative, which is itself a function, can be used to understand the behavior of the function. • The derivative has multiple interpretations and applications including those that involve instantaneous rate of change. • The Mean Value Theorem connects the behavior of a differentiable function over an interval to the behavior of the derivative of that function at a particular point in the interval. 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

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Skills	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • Interpret the meaning of areas associated with the graph of a rate of change in context. • Approximate a definite integral using geometric and numerical methods. • Interpret the limiting case of the Riemann sum as a definite integral. • Represent the limiting case of the Riemann sum as a definite integral. 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Chapter 5 – Integration</p> <p>Students will understand:</p> <ul style="list-style-type: none"> • Antidifferentiation is the inverse process of differentiation. • The definite integral of a function over an interval is the limit of a Riemann Sum over that interval and can be calculated using a variety of strategies. • The Fundamental Theorem of Calculus, which has two distinct formulations, connects differentiation and integration. • The definite integral of a function over an interval is a mathematical tool with many interpretations and applications involving accumulation. • Antidifferentiation is an underlying concept in solving separable differential equations. Solving separable differentiable equations involves determining a function or relation given its rate of change. 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

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Skills	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • Represent accumulation functions using definite integrals. • Calculate a definite integral using areas and properties of definite integrals. • Evaluate definite integrals analytically using the Fundamental Theorem of Calculus. • Determine antiderivatives of functions and indefinite integrals, using knowledge of derivatives. • For integrands requiring substitution or rearrangements into equivalent forms: (a) Determine indefinite integrals. (b) Evaluate definite integrals. • Determine the average value of a function using definite integrals. • Determine values for positions and rates of change using definite integrals in problems involving rectilinear motion. • Interpret the meaning of a definite integral in accumulation problems. • Determine net change using definite integrals in applied contexts. • Calculate areas in the plane using the definite integral. • Interpret verbal statements of problems as differential equations involving a derivative expression. • Verify solutions to differential equations. • Estimate solutions to differential equations. • Determine general solutions to differential equations. 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Chapter 6 – Applications of Integration</p> <p>Chapter 7 – Integration Techniques</p> <p>Students will understand:</p> <ul style="list-style-type: none"> • Antidifferentiation is the inverse process of differentiation. • The definite integral of a function over an interval is the limit of a Riemann Sum over that interval and can be calculated using a variety of strategies. • The Fundamental Theorem of Calculus, which has two distinct formulations, connects differentiation and integration. • The definite integral of a function over an interval is a mathematical tool with many interpretations and applications involving accumulation. • Antidifferentiation is an underlying concept in solving separable differential equations. Solving separable differentiable equations involves determining a function or relation given its rate of change. 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

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Skills	Materials/Unit	Methods/Assessment
<ul style="list-style-type: none"> • Apply appropriate mathematical rules or procedures, with and without technology. • Identify a re-expression of mathematical information presented in a given representation. • Explain the meaning of mathematical solutions in context. • Confirm that solutions are accurate and appropriate. • Use appropriate graphing techniques. 	<p>Materials:</p> <p>Calculus, AP Edition: Briggs, Cochran, Gillett, Pearson, 2018.</p> <p>Chapter 8 – Differential Equations</p> <p>Students will use their learning to:</p> <ul style="list-style-type: none"> • Model situations with differential equations. • Verify solutions for differential equations. • Sketch slope fields. • Reason using slope fields. • Approximate solutions. • Find general solutions using separation of variables. • Find particular solutions using initial conditions and separation of variables. • Use exponential models with differential equations. 	<p>Methods:</p> <ul style="list-style-type: none"> • Lecture • Demonstration • Note-taking • Discussion • Practice <p>Assessment:</p> <ul style="list-style-type: none"> • Teacher Observation • Class Participation • Group Participation • Completion of assigned tasks • Quizzes • Summative Tests

May 9, 2024