

Wyoming Department of Education Required Virtual Education Course Syllabus

Sheridan County School District # 1

Program Name	Sheridan County School District #1 Virtual School	Content Area	MA
Course ID	AC02124	Grade Level	11 - 12
Course Name	AP Calculus AB	# of Credits	1
SCED Code	02124	Curriculum Type	Acellus

COURSE DESCRIPTION

Acellus AP Calculus is a two-part advanced placement course providing students with the curriculum required by the College Board for AP Calculus AB and BC. Students completing this course will be able to take the AP Calculus exam, enabling them to earn college credit for taking this course while still in high school. Besides learning how to use the basic tools of Calculus, students completing this course learn on a deeper level what they are really doing and why it works. This provides insight few students experience in more conventional Calculus courses, empowering them with the knowledge required to solve real world problems. This course has been audited and approved by the College Board. Acellus AP Calculus is A-G Approved through the University of California.

STANDARD #	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.*
F.BF.1b	Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
F.BF.5	(+)Build new functions from existing functions. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Unit 1 – Pre-Calculus Review	F.BF.5	In this unit students learn parent functions, polynomial – power functions, and trigonometric functions. They also learn radical, rational, inverse, logarithmic, and exponential functions, and polynomial inequalities.
Unit 2 – Limits and Continuity		In this unit students learn computations of limits, indeterminate forms and limits to infinity. They also learn proving continuity, intermediate value theorem, and types of discontinuity.
Unit 3 – Derivatives: Part I		In this unit students learn average versus instantaneous velocity, the tangent of $y=x^2$ and of $y=1/x$, the general rule of the derivative, and derivatives of constant and linear functions. They also learn the power rule for derivatives, and combination rules: sum and difference, product rule, and quotient rule.
Unit 4 – Derivatives: Part II		In this unit students learn tangent and normal lines, approximating values of functions using local linearization, and local linearity and differentiability. They also learn derivatives of trigonometric functions, product and quotient rules with trigonometric and algebraic functions, numerical derivative with a calculator, predicting what $f'(x_0)$ looks like graphically, and the graph of the derivative (calculator based).

Unit 5 – Derivatives: Part III	A.SSE.1	In this unit students learn the chain rule and chain rule activity, velocity of a particle in motion, and acceleration with analysis. They also learn implicit differentiation: the differential method and the y' method.
Unit 6 – Derivatives: Part IV		In this unit students learn the derivative of the exponential function, inverse functions and derivatives, properties of logarithms, derivative of the logarithmic functions, and logarithmic differentiation. They also learn combination rules, and derivatives of inverse trigonometric functions.
Unit 7 – Derivatives: Part V	A.SSE.1	In this unit students learn analysis using first and second derivatives, and absolute extremes. They also learn optimization problems, related rates, and mean value theorem for derivatives.
Unit 8 – Anti-Differentiation: Part I	A.SSE.1, F.BF.1b, F.BF.5	In this unit students learn anti-differentiation, the chain rule and anti-differentiation, U-substitution, and anti-derivatives with initial conditions. They also learn particle motion, exponential growth, decay and Newton's law of cooling, slope fields, and slope fields with initial value problems.
Unit 9 – Anti-Differentiation: Part II	A.SSE.1	In this unit students learn definite integrals, the fundamental theorem of calculus, and approximate area using numerical methods. They also learn Riemann Sums – midpoint, net area, definite integrals with calculator, properties of the definite integral, U-substitution with definite integrals, and the velocity/position connection.
Unit 10 – Anti-Differentiation: Part III	A.SSE.1	In this unit students continue to study anti-differentiation. They learn numerical approximations: the trapezoid rule, area under a curve, area of a region between two curves, and the average rule.
Unit 11 – Anti-Differentiation: Part IV	A.SSE.1	In this unit students learn volumes of solids of revolution: the disc, washer, and shell methods. They also learn volume of solids with known cross sections, arc length and surfaces of revolution, integration to find surface area, work problems, and liquid pressure and fluid force.
Unit 12 – Anti-Differentiation: Part V	A.SSE.1	This unit reviews integrals and discusses integration by parts, and Newton's Method. They also learn indeterminate forms and L'Hopital's Rule, inverse trigonometric integrals, velocity, acceleration, and preparing for the AP Calculus AP Exam.