Subject: Calculus   **Grade: 12th grade**   **Month: Full Year class**

Standard(s)	Unit/Topic	Essential Skills: What do students absolutely need for the next level?	Resources Used	Assessment

NYS HS Math standards	Chapter 1: Functions & Algebra Skills Review (September - October)	• Represent equations in 4 ways:
		  -In words
		  -equation form
		  -graphically
		  -In a table
		• Manipulate equations using a combination of: adding, subtracting, combining like terms, multiplying, dividing, factoring, simplifying, and using structures to manipulate the terms.
		• Evaluate expressions following proper order of operations PEMDAS
		• Solve equations of varying types.
		• Recognize properties of functions and know how to determine unknown properties with technology.
		• Describe how Trig functions are used in a unit circle, how they relate to right triangles,
			• Calculus for Scientists and Engineers, Ch. 1 (Briggs, Cochran, Gillett, 2013)
			• Youtube videos by: Brian McLogan, The Organic Chemistry Tutor, Khan Academy, others
			• Jmap – AP Calculus resources
			• Khan Academy
			• Delta Math
			• IXL
			• Desmos
				• Delta Math
				• IXL
				• Desmos
				• Khan Academy
				• Quizizz
				• Formative in-class activities
				Written / Multiple Choice exam

		and how we use them in graphs.		
1.1A1 1.1A2 1.1A3 1.1B1 1.1C1 1.1C2 1.1C3 1.1D1 1.1D2 1.2A1 1.2A2 1.2A3 1.2B1	Chapter 2: Limits (November – December)	Limits One-Sided Limits, Limits at Infinity Limits That Do not Exist Estimate Limits Limits of Composite Functions Finding Limits Using Other Methods Limits Using L'Hospital's Rule Describing the Behavior of Functions Using Limits Comparing Functions Using Limits Continuity Continuous Functions Discontinuities Continuity in Theorems	• Calculus for Scientists and Engineers, Ch. 2 (Briggs, Cochran, Gillett, 2013) • Youtube videos by: Brian McLogan, The Organic Chemistry Tutor, Khan Academy, others • Jmap – AP Calculus resources • Khan Academy • Delta Math • IXL • Desmos	• Delta Math • IXL • Desmos • Khan Academy • Quizizz • Formative in-class activities Written / Multiple Choice exam
2.1A1 2.1A2 2.1A3 2.1A4 2.1A5 2.1B1 2.1C1 2.1C2 2.1C3 2.1C4 2.1C5	Chapter 3: Derivatives (January – February)	Average Rate of Change Instantaneous Rate of Change Derivatives Notation for Derivatives Representations of Derivatives Estimating Derivatives Definition of Derivative Calculating Derivatives Differentiating Sums and Differences of Functions	• Calculus for Scientists and Engineers, Ch. 3 (Briggs, Cochran, Gillett, 2013) • Youtube videos by: Brian McLogan, The Organic Chemistry Tutor, Khan Academy, others • Jmap – AP Calculus resources • Khan Academy	• Delta Math • IXL • Desmos • Khan Academy • Quizizz • Formative in-class activities Written / Multiple Choice exam

2.1C6 2.1D1 2.1D2 2.2A1		Differentiating Products and Quotients of Functions The Chain Rule Implicit Differentiation Derivatives of Inverse Functions Higher Order Derivatives Notation for Higher Order Derivatives	• Delta Math • IXL • Desmos	
2.2A1 2.2A2 2.2A3 2.2B1 2.2B2 2.3A1 2.3A2 2.3B1 2.3B2 2.3C1 2.3C2 2.3C3 2.3D1 2.3E1 2.3E2 2.4A1	Chapter 4: Applications of the Derivative (February – March)	Using Derivatives to Analyze Functions Curve Sketching Graphs of Functions and their Derivatives Continuous and Differentiable Functions Interpret Derivatives Derivatives of Functions Using Differentiation to Find a Tangent Linear Approximations Rectilinear Motion Related Rates Optimization Rates of Change Differential Equations Mean Value Theorem	• Calculus for Scientists and Engineers, Ch. 4 (Briggs, Cochran, Gillett, 2013) • Youtube videos by: Brian McLogan, The Organic Chemistry Tutor, Khan Academy, others • Jmap – AP Calculus resources • Khan Academy • Delta Math • IXL • Desmos	• Delta Math • IXL • Desmos • Khan Academy • Quizizz • Formative in-class activities Written / Multiple Choice exam
3.1A1 3.1A2 3.2A1 3.2A2	Chapter 5: Integration (April – May)	Antiderivatives Riemann Sums Approximate Definite Integrals	• Calculus for Scientists and Engineers, Ch. 5 (Briggs, Cochran, Gillett, 2013)	• Delta Math • IXL • Desmos • Khan Academy • Quizizz

3.2A3 3.2B1 3.2B2 3.2C1 3.2C2 3.2C3 3.3A1 3.3A2 3.3A3 3.3B1 3.3B2 3.3B3 3.3B4 3.3B5 3.4A1 3.4A2 3.4A3 3.4B1			Using Riemann Sums to Approximate Definite Integrals Using Geometry to Approximate Definite Integrals Properties of Definite Integrals Definite Integrals of Functions with Discontinuities Analyze Functions Defined by an Integral Second Fundamental Theorem of Calculus First Fundamental Theorem of Calculus Indefinite Integrals Closed Form Antiderivatives Techniques for Finding Antiderivatives (AB/BC) An Integral as an Accumulation of a Rate of Change An Integral of a Rate of Change as the Net Change Interpreting a Definite Integral as the Limit of a Riemann Sum Average Value of a Function	• Youtube videos by: Brian McLogan, The Organic Chemistry Tutor, Khan Academy, others • Jmap – AP Calculus resources • Khan Academy • Delta Math • IXL • Desmos	• Formative in-class activities Written / Multiple Choice exam

3.4C1 3.4D1 3.4D2 3.4E1 3.5A1 3.5A2 3.5A3 3.5A4 3.5B1	Chapter 6: Applications of Integration (June)	Rectilinear Motion Using Definite Integrals to Calculate Area (AB/BC) Using Definite Integrals to Calculate Volume Using Definite Integrals to Calculate Accumulation and Net Change Differential Equations (AB/BC) Differential Equations	• Calculus for Scientists and Engineers, Ch. 6 (Briggs, Cochran, Gillett, 2013) • Youtube videos by: Brian McLogan, The Organic Chemistry Tutor, Khan Academy, others • Jmap – AP Calculus resources • Khan Academy • Delta Math • IXL • Desmos	• Delta Math • IXL • Desmos • Khan Academy • Quizizz • Formative in-class activities Written / Multiple Choice exam
All HS Math Standards AP Calculus Standards, most of AB (link)	Final Exam	All Content from the course	• AP Calculus sample test items • Examples from Textbook [Calculus for Scientists and Engineers (Briggs, Cochran, Gillett, 2013)] • Khan Academy	Final Exam – Graphing Project Final Exam – Multiple Choice/ Written portion

Standards used for AP Calculus AB: HS-N.Q, HS-N.CN, HS-N.VM.6-12, HS-A-SSE, HS-A.APR, HS-A-CED, HS-A-REI, HS-F.IF, HS-F-BF, HS-F-LE, HS-F-TF, HS-G-CO, HS-G-SRT, HS-G-C, HS-G-GPE, HS-G-GMD, HS-S-ID.6-8

Standards list from JMAP: https://jmap.org/JMAP_FOR_CALCULUS.htm