The mission of Hermon High School is to prepare students for personal success in college, work, and community.

Calculus 2017-18

Instructor:
Wendy Lynds
Room 207
lyndsw@hermon.net

This course is designed to give students at least one semester of college Calculus. An understanding of limits, trigonometry and functions is necessary. An in-depth study of limits, derivatives, integrals and the applications of each will be the focus of the course. It can be taken for dual credit (high school and college credit) through USM's ASPIRE program. USM credit requires a $75 USM registration fee. 1 HHS credit, 4 credit hours – USM.

Graduation Standards (the number of the standard is referenced in the performance indicators listed in each unit):

1-Number & Quantity: Reason and model quantitatively, using units and number systems to solve problems.
3-Functions: Interpret, analyze, construct, and solve linear, quadratic, and trigonometric functions.

Unit 1 Precalculus Review & Limits

Summary	In this unit students will review the concepts of precalculus which are most important to early success in calculus. Topics will include linear and nonlinear functions, their graphs, roots, and important features. Concepts of limits will be covered in detail as limits are what distinguish calculus from algebra. Students will understand the concept of a limit, be able to find limits through graphical, numerical, and algebraic techniques and explain why some limits do not exist. Limits will be used to determine continuity.
Performance Indicators Assessed in Unit	M.1A Compute within the real number system. M.3E Analyze functions using different representations. M.3H Understand limits and apply to determining continuity of a function

Unit 2 Derivatives

Summary	Concepts of derivatives will be covered in detail. The unit begins with using the definition of a derivative to find instantaneous rates of change. This is followed with a discussion of what it means for a function to be differentiable. Students then learn rules for differentiation and go one to find velocity and other rates of change. Derivatives of trigonometric, logarithmic, exponential and inverse trigonometric functions are learned and applied. Students learn to take derivatives of composite functions through the use of the chain rule and implicit functions through implicit differentiation.
Performance Indicators Assessed in Unit	M.1A. Compute within the real number system. M.3I Find derivatives of functions and apply in problem solving.

Unit 3 Applications of Derivatives

Summary	Once all derivative techniques have been learned, students begin using the derivative to determine extrema, concavity, and to graph functions. Students learn and apply the Mean Value Theorem. Modeling and optimization are emphasized as students solve min/max problems and related rate problems.
Performance Indicators Assessed in Unit	M.1A Compute within the real number system. M.3I Find derivatives of functions and apply in problem solving.

Unit 4 Integrals

Summary	We begin our study of 'accumulation' through estimating with finite sums and define the

	definite integral as a limit of Riemann sums. We extend our knowledge of integration to antiderivatives and use the Fundamental Theorem of Calculus to connect derivatives with integrals. When given numerical data, we use trapezoidal approximations to find accurate estimates of integrals. We will explore methods of rebuilding from derivative to original functions by using slope fields and Euler's method. We perform algebraic integration using substitution.
Performance Indicators Assessed in Unit	M.1A Compute within the real number system. M.3I Find integrals of functions and apply in problem solving.
Unit 5	**Integrals & Applications**
Summary	We look at specific applications of the derivative/integral relationship in exponential growth and decay, and logistic growth. Finally, we use integration to accumulate volumes of rotation and volumes of solids with known cross sections.
Performance Indicators Assessed in Unit	M.1A Compute within the real number system. M.3I Find integrals of functions and apply in problem solving.