West Linn–Wilsonville School District

Mathematics Department – Course Statement

Course Title: Advanced Placement (AP) Calculus AB

Length of Course: Year
Number of Credits: 1
Grade Level: 11, 12
Prerequisites: Pre-Calculus or Trigonometry

Date of Description/Revision: 2013

Course Overview

AP Calculus AB covers the first two terms of college level calculus. The two main topics are differential and integral calculus. Given any curve, the student will discuss three main questions: 1. How do I numerically, graphically or algebraically determine the slope of any tangent line to this curve? 2. How do I numerically, graphically or algebraically determine the area between the x-axis and this curve on any given interval? 3. What are the real world applications of this analysis?

Essential Questions

Concepts providing focus for student learning

- Why is Calculus called the language of physics?
- What are the real world applications of differential calculus?
- What are the real world applications of integral calculus?
- How do Algebra, Geometry, Advanced Algebra, Trigonometry, Functions, Statistics and Discrete Math relate to Calculus?

Proficiency Statements

Upon completion of course, students will be able to:

- Describe the derivative and the integral of any given set of data numerically, graphically and algebraically.
- Take this description and communicate its meaning.

Common Core Standards for Mathematical Practice

Students will develop the following practices throughout the course:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision
- Look for make use of structure.
- Look for and express regularity in repeated reasoning.

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General Course Topics/Units & Timeframes	

A. Fitting a mathematical model to a set of data; algebraically, numerically and graphically representing these functions, their inverses and translations.

B. Analyzing the limit of a function numerically, graphically, and algebraically.

C. Average rates of change and Instantaneous rates of change: instantaneous rates of change as the slope of the tangent line, as a limit, and as a function.

D. The derivative: algebraic representations, applications and graphical approximations.

E. The integral (or the anti-derivative): slope fields as a graphical way to see the anti-derivative, Reimann Sums, the limit of an infinite series, algebraic representations, and The Fundamental Theorem of Calculus.

F. The integral: algebraic representations, applications and graphical approximations.

Resources	

- Text: *Calculus: Concepts & Contexts, 4th Edition (Complete Edition - Multivariable)*, Stewart, Brooks/Cole, 2010
- Other: AP course materials and tests; personal books