2014-2015 Advanced Placement Calculus – J. Powell and M. Baker

jpowell@wcpss.net and mbaker4@wcpss.net

Course Overview Calculus is the mathematics of motion and change. Quantities such as velocity and acceleration provide engineers, scientists, and economists with tools to model real-world situations. The primary goal of this course is to develop students' understanding of calculus and provide opportunities to apply its techniques. Throughout the course, material will be presented, practiced, and assessed in a multi-representational manner. It is expected that students express ideas, solutions, and problems graphically, numerically, analytically, and verbally. There will be a strong emphasis placed on the connections among these representations. Four major themes will be developed throughout the course: limits, derivatives, indefinite integrals, and definite integrals.

Structure of the Test The Advanced Placement Calculus exam is 3 hours and 15 minutes and consists of 4 parts:

Part 1- 28 no calculator multiple-choice questions (55 minutes)
Part 2- 17 calculator-active multiple-choice questions (50 minutes)
Part 3- 2 calculator-active free response questions (30 minutes)
Part 4- 4 no calculator free response questions (60 minutes)

Course Objectives AP Calculus Students will be able to:

- ✧ work with functions represented in a variety of ways--graphical, numerical, analytical, or verbal—and understand the connections among these representations.
- ✧ understand the meaning of the derivative in terms of a rate of change & local linear pproximation and use derivatives to solve a variety of problems.
- ✧ understand the meaning of the definite integral both as a limit of Riemann sums & as the net accumulation of change and use integrals to solve a variety of problems.
- ✧ understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus
- ✧ communicate mathematics and explain solutions to problems both verbally and in written sentences in the context of the problem situation.
- ✧ model a written description of a physical situation with a function, a differential equation, or an integral.
- ✧ use technology to help solve problems, experiment, interpret results, and support conclusions.
- ✧ to determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
- ✧ develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment
- ✧ work cooperatively with peers in group settings

Outline for the Course/Thematic Breakdown

AP Calculus AB

Limits and Continuity
Derivative Rules
Applications of Derivatives
Integration
Differential Equations and Slope Fields
Area and Volume of Solids

AP Calculus BC

More Integration Techniques
Series
Taylor & Maclaurin Polynomials and Error
Vectors, Parametrics, and Polar Equations

Grading Policies

Tests 60%
Quizzes 30%
Homework and Problem Sets 10%

Teaching Strategies Most class sessions will include lecture, follow-up from homework, and an opportunity to work cooperatively on problems. Each unit will have a problem set graded for accuracy and 1-2 quizzes (usually calculator-inactive and open-ended). Nightly homework assignments will be checked for completion randomly throughout the unit. The unit test will be structured in AP exam format. Practice free response questions will be given within each unit.

Student Expectations

- ✧ Prepare to take the AP Calculus BC exam in May.
- ✧ Come to class on time and prepared to learn.
- ✧ Attend HOT lunch tutorials (required if average is failing or if student is missing an assignment).
- ✧ Work cooperatively with others within the classroom and outside of school within study groups.
- ✧ Maintain a high level of integrity on all assignments and assessments.
- ✧ Organize your work (notes, homework, problem sets, reviews).