## COURSE DESCRIPTION

**Course Title:**            AP Calculus AB
**Course Number:**        00292
**Course Prerequisites:**  Completion of Pre-Calculus Honors or Pre-Calculus CP with an average of 80% or above.

**Course Description:**   This is the first course in the Calculus sequence and is intended for all mathematics, engineering, and science students who want to further their fundamental knowledge of mathematics.  This course is designed to study: limits, derivatives, trigonometric functions, the integral, and applications of these ideas in various math, science, and physics problems.

**Suggested Grade Level**: Grades 11-12
**Length of Course:**      Two Semesters
**Units of Credit:**        1
**PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:**
CSPG #50
To find the CSPG information, go to CSPG
**Certification verified by the WCSD Human Resources Department:**     ☒Yes        ☐No

## WCSD STUDENT DATA SYSTEM INFORMATION

**Course Level:**      AP (1) GPA +10%
**Mark Types:**       Check all that apply.
                        ☒F – Final Average      ☒MP – Marking Period      ☒EXM – Final Exam

**GPA Type**:            ☐ GPAEL-GPA Elementary  ☐ GPAML-GPA for Middle Level   ☒ NHS-National Honor Society
                        ☒ UGPA-Non-Weighted Grade Point Average     ☒ GPA-Weighted Grade Point Average

**State Course Code**:    02124
To find the State Course Code, go to State Course Code, download the Excel file for *SCED*, click on SCED 6.0 tab, and chose the correct code that corresponds with the course.

## TEXTBOOKS AND SUPPLEMENTAL MATERIALS

**Board Approved Textbooks, Software, and Materials:**
| | |
|---|---|
| **Title:** | Calculus AP |
| **Publisher:** | Cengage Learning |
| **ISBN #:** | 9781337286886 |
| **Copyright Date:** | 2018 |
| **WCSD Board Approval Date:** | 6/29/2020 |

**Supplemental Materials:**     Khan Academy Website, KUTA Software Website, AP Classroom

## Curriculum Document

**WCSD Board Approval:**
| | |
|---|---|
| **Date Finalized:** | 6/5/2020 |
| **Date Approved:** | 6/29/2020 |
| **Implementation Year:** | 2020-2021 |

## SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

## SCOPE AND SEQUENCE OF CONTENT, CONCEPTS, AND SKILLS

| Performance Indicator | PA Core Standard and/or Eligible Content | Month Taught and Assessed for Mastery |
|---|---|---|
| Define a limit. (1.2) | Click or tap here to enter text. | September September |
| Use limit notation. (1.2) | Click or tap here to enter text. | September September |
| Estimate limit values from graphs. (1.2) | Click or tap here to enter text. | September September |
| Estimate limit values from tables. (1.2) | Click or tap here to enter text. | September September |
| Determine limits using algebraic properties of limits. (1.3) | Click or tap here to enter text. | September September |
| Determine limits using algebraic manipulation. (1.3) | Click or tap here to enter text. | September September |
| Select procedures for determining limits. (Supplemental) | Click or tap here to enter text. | September September |
| Determine limits using the Squeeze Theorem. (1.3) | Click or tap here to enter text. | September September |
| Connect multiple representations of limits (Supplemental) | Click or tap here to enter text. | September September |
| Explore different types of discontinuities. (1.4) | Click or tap here to enter text. | September September |
| Define continuity at a point. (1.4) | Click or tap here to enter text. | September September |
| Confirm continuity over an interval. (1.4) | Click or tap here to enter text. | September September |
| Remove discontinuities. (1.4) | Click or tap here to enter text. | September September |
| Connect infinite limits and vertical asymptotes. (1.5) | Click or tap here to enter text. | September October |
| Connect limits at infinity and horizontal asymptotes. (3.5) | Click or tap here to enter text. | September October |
| Work with the Intermediate Value Theorem (IVT). (1.4) | Click or tap here to enter text. | September October |
| Define average and instantaneous rates of change at a point (2.1 and 2.2) | Click or tap here to enter text. | October October |
| Define the derivative of a function. (2.1) | Click or tap here to enter text. | October October |
| Use the derivative function. (2.1) | Click or tap here to enter text. | October October |
| Estimate derivatives of a function at a point.  (Supplemental) | Click or tap here to enter text. | October October |
| Connect differentiability and continuity (when derivatives do and do not exist) (2.1) | Click or tap here to enter text. | October October |
| Apply the Power Rule (2.2) | Click or tap here to enter text. | October October |
| Use derivative rules (Constant, Sum, Difference, and Constant Multiple) (2.2) | Click or tap here to enter text. | October October |
| Find derivatives of cos x, sin x, e^x, and ln x (2.2 and 5.1 and 5.4) | Click or tap here to enter text. | October October |
| Use the Product Rule. (2.3) | Click or tap here to enter text. | October October |

| | | |
|---|---|---|
| Use the Quotient Rule. (2.3) | Click or tap here to enter text. | October October |
| Find the derivative of tangent, cotangent, secant, and/or cosecant functions. (2.3) | Click or tap here to enter text. | October October |
| Use the Chain Rule. (2.4) | Click or tap here to enter text. | November November |
| Use implicit differentiation. (2.5) | Click or tap here to enter text. | November November |
| Differentiate inverse functions. (5.3) | Click or tap here to enter text. | November November |
| Differentiate inverse trigonometric functions. (5.7) | Click or tap here to enter text. | November November |
| Select procedures for calculating derivatives. (Supplemental) | Click or tap here to enter text. | November November |
| Calculate higher-order derivatives. (2.3) | Click or tap here to enter text. | November November |
| Interpret the meaning of the derivative in context. (2.6) | Click or tap here to enter text. | November November |
| Connect position, velocity, and acceleration (straight-line motion). (2.2) | Click or tap here to enter text. | November November |
| Use rates of change in applied context other than motion. (2.6) | Click or tap here to enter text. | November December |
| Set up related rates. (2.6) | Click or tap here to enter text. | November December |
| Solve related rates problems. (2.6) | Click or tap here to enter text. | November December |
| Approximate values of a function using local linearity and linearization. (3.9) | Click or tap here to enter text. | November December |
| Use L'Hopital's Rule for determining limits of indeterminate forms. (5.6) | Click or tap here to enter text. | November December |
| Use the Mean Value Theorem. (3.2) | Click or tap here to enter text. | December December |
| Use the Extreme Value Theorem. (3.1) | Click or tap here to enter text. | December December |
| Find global extrema, local extrema, and critical points. (3.1) | Click or tap here to enter text. | December December |
| Determine intervals on which a function is increasing or decreasing. (3.3) | Click or tap here to enter text. | December December |
| Use the First Derivative Test to determine relative (local) extrema. (3.3) | Click or tap here to enter text. | December December |
| Use the Candidates Test to determine absolute (global) extrema. (Supplemental) | Click or tap here to enter text. | December December |
| Determine concavity of functions over their domains. (3.4) | Click or tap here to enter text. | December December |
| Use the Second Derivative Test to determine extrema. (3.4) | Click or tap here to enter text. | December December |
| Sketch graphs of functions and their derivatives. (3.6) | Click or tap here to enter text. | December January |
| Connect a function, first derivative, and second derivative. (Supplemental) | Click or tap here to enter text. | January January |
| Set up optimization problems. (3.7) | Click or tap here to enter text. | January January |
| Solve optimization problems. (3.7) | Click or tap here to enter text. | January January |

# WARREN COUNTY SCHOOL DISTRICT

## PLANNED INSTRUCTION

| | | |
|---|---|---|
| Explore behaviors of implicit relations. (Supplemental) | Click or tap here to enter text. | January January |
| Explore accumulations of change. (4.2) | Click or tap here to enter text. | January January |
| Approximate Riemann Sums. (4.3) | Click or tap here to enter text. | January January |
| Use Riemann Sums, summation notation, and definite integral notation. (4.2 and 4.3) | Click or tap here to enter text. | January January |
| Use the Fundamental Theorem of Calculus with accumulation functions involving area. (4.2) | Click or tap here to enter text. | January February |
| Interpret the behavior of accumulation functions involving area. (4.2) | Click or tap here to enter text. | January February |
| Apply properties of definite integrals. (4.3) | Click or tap here to enter text. | January February |
| Use the Fundamental Theorem of Calculus with definite integrals. (4.4) | Click or tap here to enter text. | February February |
| Find the antiderivatives and indefinite integrals using basic rules and notation. (4.1) | Click or tap here to enter text. | February February |
| Integrate using substitution. (4.5) | Click or tap here to enter text. | February February |
| Integrate functions using long division and completing the square. (5.2 and Supplemental) | Click or tap here to enter text. | February February |
| Select techniques for antidifferentiation. (Supplemental) | Click or tap here to enter text. | February February |
| Model situations with differential equations. (Supplemental) | Click or tap here to enter text. | February February |
| Verify solutions for differential equations. (3.9) | Click or tap here to enter text. | February February |
| Sketch slope fields. (6.1) | Click or tap here to enter text. | February February |
| Reason using slope fields. (6.1) | Click or tap here to enter text. | February February |
| Find general solutions using separation of variables. (6.3) | Click or tap here to enter text. | February February |
| Find particular solutions using initial conditions and separation of variables. (6.3) | Click or tap here to enter text. | February February |
| Model exponentials with differential equations. (5.4 and 5.5) | Click or tap here to enter text. | February February |
| Find the average value of a function on an interval. (4.4) | Click or tap here to enter text. | March March |
| Connect position, velocity, and acceleration of functions using integrals. (Supplemental) | Click or tap here to enter text. | March March |
| Use accumulation functions and definite integrals in applied contexts. (Supplemental) | Click or tap here to enter text. | March March |
| Find the area between curves expressed as functions of x. (7.1) | Click or tap here to enter text. | March March |
| Find the area between curves expressed as functions of y. (7.1) | Click or tap here to enter text. | March March |
| Find the area between curves that intersect at more than two points. (7.1) | Click or tap here to enter text. | March March |
| Find the volume with cross sections of squares and rectangles. (Supplemental) | Click or tap here to enter text. | March March |
| Find the volume with cross sections of triangles and semicircles. (Supplemental) | Click or tap here to enter text. | March April |

| | | |
|---|---|---|
| Find the volume using disc method revolving around x- or y-axis. (7.2) | Click or tap here to enter text. | March April |
| Find the volume using disc method revolving around other axes. (7.2) | Click or tap here to enter text. | March April |
| Find the volume using washer method revolving around the x- or y-axis. (7.2) | Click or tap here to enter text. | April April |
| Find the volume using washer method revolving around other axes. (7.2) | Click or tap here to enter text. | April April |
| AP Exam Review | Click or tap here to enter text. | April May |

## ASSESSMENTS

**PSSA Academic Standards, Assessment Anchors, and Eligible Content:** The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

**Formative Assessments:** The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

**Effective formative assessments for this course include:** Suggested but not limited to:  Bell Ringers, Exit Tickets, Quizzes, Cooperative Learning, Observations, Written work, Oral response, Self-evaluation, Homework, and Projects

**Summative Assessments:**  The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

**Effective summative assessments for this course include:** Suggested but not limited to:  Performance Assessments, Chapter/Unit Tests, and Projects