

AP CALCULUS AB

COURSE OVERVIEW

AP Calculus AB will engage learners in deep mathematical concepts and applications with a strong foundation of calculus principles and theorems. Students will be expected to investigate and solve a wide range of problems, express results, methods of solving, and applications of concepts numerically, graphically, analytically, and verbally. Students will be challenged to gain a deeper knowledge of mathematical concepts and the relationships between them while making connections among many disciplines of study. The AB course involves the introduction and mastery of differential calculus concepts as well as a strong foundation in integral calculus. There are four major goals for this course: 1) each student is well-prepared for post-secondary success in college and mathematics; 2) each student will communicate mathematical concepts, ideas, and solutions through proof and justification; 3) each student can apply their knowledge of calculus to problems that occur in other disciplines such as the science or business fields; and finally 4) each student will score appropriately on the advanced placement exam to earn credit at their selected university.

COURSE MATERIALS

Textbook: *Calculus of a Single Variable*, 7th Edition, Larson, Hostetler, and Edwards

Daily Materials:

Students are expected to supply a 3-ring binder for this course with dividers headed as notes, homework, labs/quizzes, tests, and journal. Students should supply their own loose leaf paper, graph paper, and pencils. The journal section of the binder should have a small spiral bound journal attached for documenting and communicating important calculus concepts.

Calculators:

It is expected that students have access to and use on a daily basis a graphing calculator. The TI-89, TI-83, TI-83 plus, and TI-84 are recommended, with a strong recommendation for use of the TI-89. This course will be taught using the TI-84 and TI-89.

Students will be instructed on calculator usage via TI Smartview and individual demonstration. The goal of using graphing calculators is to provide AP Calculus AB students with the experience to use and apply technology for conceptual mathematics.

Internet Access:

Students will need to have access to the internet to participate in the on-line classroom activities. Students will be allowed to access the internet during class time or Visit-Instruct-Plan (V.I.P.) time to complete activities if they do not have internet capabilities at home. We will be using Moodle for our on-line activities some of which include a discussion board for homework help, reading assignments from journals with discussion. The primary reason for using Moodle is to create an atmosphere of team work in learning and to strengthen written communication skills. Students must learn to ask the right questions and learn to express themselves clearly in all aspects of life. It is hoped that the practice of asking and answering questions with fellow students will enable each student to communicate clearly when he takes the exam and when he is defending his results in any presentation. A secondary goal of Moodle is to help students refine their understanding of concepts. Speaking to others helps to see different points of view and nuances that may have been missed during class discussion and lecture.

There will also be a web page for this course with all of the needed course information such as a calendar for when you are absent, instant access to current grades, a list of upcoming events, and helpful hints and links.

Additional Materials:

(to be provided by the teacher)

Theme Sheets provided with the textbook

Lab Activities provided with the textbook

Lab Activities developed by the instructor

Single Variable Calculus Early Transcendentals, Rogawski

Single Variable Calculus Concepts and Contexts, Stewart

Calculus, Graphical, Numerical, Algebraic, Finney, Demana, Waits, Kennedy

AP Test Prep Series for AP Calculus, Finney, Demana, Waits, Kennedy

Calculus, Paul Forrester

Calculus Explorations, Paul Forrester

Released Multiple Choice and Free Response Question from the College Board

TEACHING METHODS

The teacher will engage students in many different teaching methods. Students will work cooperatively in groups on a daily basis to discuss and solve problems. Students will also participate in inquiry, role-play, debate, socratic seminar, and jigsaw based lessons. These teaching methods will require students to hypothesize and investigate solutions, work with others, design explanations using research and theory, and explain Calculus topics to peers.

EVALUATION INFORMATION

The student's grade will be based on several factors: homework assignments, reading assignments, journal entries, lab activities, quizzes, projects, and tests. Graded assignments shall not be submitted in ink. The six weeks average will be computed using the following weighting scheme:

Tests: 40%

Projects/Lab Activities: 30%

Homework/Journal/Reading and Writing Assignments/Discussion Board Postings: 10%

Quizzes: 20%

In addition, the semester grade is calculated by allowing each six weeks grade to count as 28% of the grade and the semester exam to count as 16%.

Quizzes and tests will model concepts applied during class and homework exercises. Homework will be assigned nightly and quizzes will be given frequently. Quizzes and tests may include but are not limited to the following: AP released multiple choice or free response questions, homework problems, essay and short answer questions. Tests are formatted as the AP Exam with a multiple choice section and a free response section. Assessments will include both calculator and non calculator portions to help prepare students for success on the AP exam.

Homework grades are based both on processes shown to solve and amount completed. It is imperative students complete all homework assignments and come prepared to VIP daily to discuss solutions with fellow classmates. Due to the nature of the class and the amount of topics to cover, there is not typically time during the class period to go over homework questions. However, some study/work days will be incorporated so students can work together and seek the teacher's help. Homework will be collected after 5 assignments have been given. It is expected that students put forth exemplary effort on each problem assigned. Problems given for homework will model AP questions like those found on the exam. Students should expect about an hour of homework each night, including weekends.

Projects and labs are extended activities intended to assess both depth of understanding and skills needed to solve real-world problems using calculus. Students will be required to complete two – three labs per six weeks. Extra instruction will be provided before school and/or during lunch to maximize student comprehension. Examples of these labs and activities are given in the course calendar. Throughout the course, students will engage in research of the history of mathematics, mathematicians, and various mathematical concepts. Students will be expected to read journal articles and write a one page summary response. Articles may be provided by the teacher, the interactive textbook CD, or chosen by the student.

COURSE CALENDAR

⊕ **Functions, Graphs, and Limits (Summer Work plus 15 Days)**

- ◆ Review work on functions, parametric equations, and polar equations
 - Introduction to limits as the basis of calculus
- ◆ Analysis of Graphs
 - Worksheet on Families of Graphs, Their Domains, and Ranges
 - Calculus Calculator Labs: Lab # 1, #2
- ◆ Limits of functions
 - Calculus Calculator Labs: Lab #3
- ◆ Asymptotic and Unbounded Behavior
- ◆ Continuity as a Property of Functions

⊕ **Derivatives (55 Days)**

- ◆ Concept of the Derivative and Derivatives at a Point
 - Calculus Calculator Labs: Lab #4
- ◆ The Derivative as a Function and the Mean Value Theorem
 - Worksheet on Rolle's Theorem and the MVT
- ◆ Higher Order Derivatives and Applications of Derivatives
 - Larson Lab Manual #3: Falling Objects

- Worksheet on Summary of Curve Sketching
- Activity on Slope Fields
- Activity on Graphs of Functions and Their First Two Derivatives
- Larson Lab Manual # 5: Packaging Optimization

◆ L'Hopital's Rule, Euler's Method, Newton's Method

- Connecting Euler's Method to the Fundamental Theorem of Calculus
- Activity on Euler's Method to Model Real-World Problem-Solving

⊕ **Integrals (75 Days)**

◆ Interpretations and Properties of Definite Integrals

- Worksheet on Riemann sums using Left, Right, and Midpoint Evaluations
- Worksheet on the Integral as the Change in Quantity over an Interval
- Activity on the Properties of Definite Integrals

◆ The Fundamental Theorem of Calculus

- Worksheet on the FTC
- Worksheet on the 2nd FTC
- Worksheet on the Integral as an Accumulator Function

◆ Applications of Integrals

- Larson Lab Manual # 7: Newton's Law of Cooling
- Larson Lab Manual # 8: Stretching a Spring: Hooke's Law
- Computer Simulation on Fluid Pressure
- Activity on Work Performed by a Constant Force
- Activity on Finding the Volume of Solid with Known Cross-Sections

◆ Techniques of Antidifferentiation

- Worksheet on Integration by Parts
- Worksheet on Simple Partial Fractions

- Worksheet on Improper Integrals

◆ Applications of Antidifferentiation

- Worksheet on Separable Differential Equations
- Calculus Calculator Labs: Lab #9
- Calculus Calculator Labs: Lab # 13
- Activity on Radioactive Carbon Dating

◆ Numerical Approximations to Definite Integrals

⊕ REVIEW (15 Days+)

The review time will be spent working released multiple-choice and free-response questions as well as group problem-solving activities. In general, the students will complete a multiple choice practice section of 5-6 questions or a single free-response question individually for the first part of class. The questions will be solved by students or the instructor and the topics covered will be reviewed. The students will have homework assignments consisting of review questions and old test questions. The students will also work through the Fast Track to a 5 book and work on Theme Sheets that accompany the Larson text.

INSTRUCTOR INFORMATION

Instructor: Mrs. Mary Elizabeth Fugate

School Email Address: fugateb@rcs.k12.tn.us

School Phone Number: 615-904-6710

Planning Period: 1:45-2:45 Daily

I generally arrive at school by 6:30 a.m. I am more than happy to meet before school, during lunch, or stay later at your request. Please give advance notice if you would like me to come at another time.