

Equinox Program

Session 1

Course Title: Advanced Placement Calculus AB

Course Description

Rocket scientist or brain surgeon, architect or engineer — the study of calculus is the foundation for many professional endeavors. This college-level calculus course covers analytic geometry, functions, limits, continuity, derivatives, integrals and their applications. It explores symbolic differentiation and integration utilities as students apply these skills to solve problems. Upon successful completion, students are prepared to take the AP Calculus AB exam.

The purpose of this course is to emphasize the study of functions and other skills necessary for the study of calculus. Our goal is to cover the comprehensive content of Advanced Placement Calculus as detailed in the AP Calculus Course Description. Students are taught to understand concepts related to functions by analyzing functions graphically, numerically, analytically and verbally.

Essential Questions

- How are functions related to one another and how do we understand their behavior based upon the analysis of their numerical, graphical, algebraic and verbal representations?
- How do derivatives help us understand the behaviors of functions and help us interpret real-world scenarios and problems?
- What is an integral and how do we apply this function to find accumulations and further interpret functions?

Outcomes

Upon successful completion of this course, students will analyze functions graphically, numerically, algebraically and verbally in order to:

- Find limits (both one-sided and two-sided)
- Determine asymptotic behavior
- Determine continuity and apply these properties within the realm of calculus
- Understand the concept of the derivative
- Compute the derivative at a point
- Determine the derivative as a function
- Compute higher-order derivatives
- Use derivatives to solve problems involving optimization
- Use derivatives to solve problems involving related rates
- Create and interpret slope fields
- Interpret integrals and their properties
- Understand the Fundamental Theorem of Calculus
- Perform techniques of anti-differentiation
- Solve problems that apply integration/anti-differentiation
- Perform numerical approximations to definite Integrals

Instructional Strategies

In order to help students understand the concepts in calculus using the various representations – graphically, numerically, analytically, and verbally - activities and instructional strategies incorporated into the course include: small group work and presentations to the larger class; concentric circle problem solving; graphing calculator activities; 3-D modeling; Socratic seminar discussions.

Resources and Materials

- Textbook: Stewart, James. Single Variable Calculus, Sixth Edition. Belmont: Brooks/Cole – Thomson Learning, 2010. ISBN 9780495011699
- Materials: Graphing Calculator (TI-84 or TI-84 Plus), pencils, erasers, 2-subject spiral notebook with graph paper

Web sites

- www.khanacademy.com – Tutorial videos on topics related to the study of calculus
- www.calcchat.com – Worked out solutions to problems assigned from various other calculus textbooks

Student Assessment

- Pre-Assessment: As a pre-test assessment, students will complete the multiple-choice portion of a previously released Advanced Placement Calculus AB exam from the College Board.
- CTD Grading Scale:

A+ 100-97%	A	96-93%	A-	92-90%
B+ 89-87%	B	86-83%	B-	82-80%
C+ 79-77%	C	76-73%	C-	72-70%
D+ 69-67%	D	66-63%	D-	62-60%
F below 60%				
- Breakdown of Final Grade: 15% homework, 25% quizzes, 30% tests, 15% alternative assessments, 15% midterm/final exam.
- Post-Assessment: Upon completion of the CTD calculus course, students will take the same pre-test that was previously administered, as a post-test, in order to evaluate student mastery and to measured academic growth related to the concepts learned during this course.

Schedule

The following schedule is a tentative schedule and is subject to change with respect to pacing.

Date	Topics	In-Class Activities	Graded Assignments or Assessment
06.27.11 Monday	<ul style="list-style-type: none"> Review of Functions Ways to Represent a Function End Behavior Domain Introduction to Limits 	<ul style="list-style-type: none"> Review of class and course expectations Ice Breaker Pre-Test Discussion of topics with notes taken Create Reference Notecard In-Class Guided Practice 	<ul style="list-style-type: none"> Pre-Test In-Class Problem Sets Homework – Based on completion and notes on corrections Study for Quiz tomorrow

Date	Topics	In-Class Activities	Graded Assignments or Assessment
06.28.11 Tuesday	<ul style="list-style-type: none"> Calculating Limits Continuity Derivatives and Rates of Change Differentiation Formulas Derivatives of Trigonometric Functions 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Quiz on Behavior of Functions Socratic Seminar – Limits Discussion of topics with notes taken In-Class Practice (independent as well as group work) Create Reference Notecard with Trigonometric Derivatives 	<ul style="list-style-type: none"> Quiz – Behavior of Functions Socratic Seminar notes and participation In-Class Problem Sets Homework - based on completion and notes on corrections Study for Quiz tomorrow
06.29.11 Wednesday	<ul style="list-style-type: none"> The Chain Rule Implicit Differentiation Related Rates 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Mini-Whiteboard Practice Activity Quiz on Limits and Derivatives Discussion of topics with notes taken In-Class Practice Group Assessment with Presentation – Related Rates 	<ul style="list-style-type: none"> Quiz – Previous Day’s Topics Group Assignment with Presentation In-Class Problem Sets Homework – based on completion and notes on corrections Study for Test tomorrow
06.30.11 Thursday	<ul style="list-style-type: none"> Applications of Differentiation Maximum and Minimum Values Mean Value Theorem How Derivatives Shape Functions 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Test on Differentiation Discussion of topics with notes taken Matching of graphs of derivatives with functions activity 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Test – Chapter 3 In-Class Problem Sets Study for Quiz tomorrow
07.01.11 Friday	<ul style="list-style-type: none"> Limits at Infinity Curve Sketching Optimization 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Quiz on topics covered on previous day Discussion of topics with notes taken Mini-White Board Practice Activity In-Class Practice 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Quiz - Previous Day’s Topics In-Class Problem Sets Study for Test on Monday (Chapter 4)
07.04.11 Monday	<ul style="list-style-type: none"> Exponential and Logarithmic Functions – How the functions behave and their derivatives Anti-Derivatives 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Test – Chapter 4 Discussion of topics with notes taken Create notecard with exponential and logarithmic derivatives In-Class Practice Socratic Seminar – Curve Sketching and Limits, continued 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Test - Chapter 4 In-Class Problem Sets Study for Midterm Exam
07.05.11 Tuesday	<ul style="list-style-type: none"> The Definite Integral Approximations (Riemann Sums, Trapezoidal Sums and Rule) The Fundamental Theorem of Calculus 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Review for Midterm Exam Midterm Exam – Chapters 1-4) Discussion of topics with notes taken 	<ul style="list-style-type: none"> Midterm Exam Homework – based on completion and notes on corrections In-Class Problem Sets

Date	Topics	In-Class Activities	Graded Assignments or Assessment
07.06.11 Wednesday	<ul style="list-style-type: none"> Indefinite Integrals Net Change Theorem u-Substitution Integration involving Trigonometric, Logarithmic and Exponential Functions 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Mini-White Board Practice Activity Discuss topics with notes taken Create reference notecard with integration rules In-Class Practice 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections In-Class Problem Sets Study for Test tomorrow
07.07.11 Thursday	<ul style="list-style-type: none"> Application of Integration <ul style="list-style-type: none"> Area Between curves Volumes of Solids of Revolution Volumes of Cross Sections 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Test – Chapter 5 Discuss topics with notes taken Introduction of the use of the graphing calculator LCD – presentation of Calculus In Motion demonstration of volumes 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Test – Chapter 5 Graphing Calculator Activity Study for quiz tomorrow
07.08.11 Friday	<ul style="list-style-type: none"> Average Value of a Function Volumes of Cross Sections 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Volumes of Cross Sections Project – Construction Quiz Discuss topics with notes taken In-Class Practice (AP Free Response Questions) 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Quiz – Previous Day’s Topics Volumes of Cross Sections Project In Class Practice Study for Test on Monday
07.11.11 Monday	<ul style="list-style-type: none"> Separable Equations Slope Fields Solving Differential Equations 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Test - Applications of Integration and Inverse Trigonometric Functions Discuss topics with notes taken In-Class Practice – Group Work (Think-Pair-Share) 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Test – Applications of Integration Study for Quiz tomorrow
07.12.11 Tuesday	<ul style="list-style-type: none"> Inverse Trigonometric Functions Derivatives of Inverse Trigonometric Functions 	<ul style="list-style-type: none"> Review of homework with re-teaching as necessary Quiz Discuss topics with notes taken In-Class Practice AP Free Response Questions 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Quiz – Previous Day’s Topics
07.13.11 Wednesday	<ul style="list-style-type: none"> Review for Final Exam 	<ul style="list-style-type: none"> Review of homework with re-teaching as needed Understanding the format of the AP Exam More on Free Response Questions Free Response Questions – Group Assignment Review Activity in preparation for Final Exam 	<ul style="list-style-type: none"> Homework – based on completion and notes on corrections Free Response Questions – Group Activity to be graded Study for Final Exam tomorrow
07.14.11 Thursday	<ul style="list-style-type: none"> Final Exam 	<ul style="list-style-type: none"> Review of homework with re-teaching as necessary Review before final exam Final Exam 	<ul style="list-style-type: none"> Final Exam (Post-Assessment) None ☺

Date	Topics	In-Class Activities	Graded Assignments or Assessment
07.15.11 Friday	<ul style="list-style-type: none"> • Closing Day 	<ul style="list-style-type: none"> • Update Reference Cards • Review final exam results • Re-teach concepts that students have questions about • Discuss Integration by Parts 	Best wishes for this coming school year! ☺

CTD Statement on Third-Party Web Sites

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.

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