Dominican International School
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COURSE SYLLABUS

School Year	2025-2026
Subject	AP CALCULUS AB
Grade Level	12
Teacher	Karen Lai
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COURSE DESCRIPTION:

Calculus is one of the most important areas of mathematics. This course is designed to help students build a solid foundation of math so that they will do well in the AP Exam and be better prepared for their future studies in colleges. Students will be introduced to the concepts and techniques of calculus through a comprehensive study of all of the topics outlined in the College Board's *Course and Exam Description: AP Calculus AB*.

COURSE OBJECTIVES:

By the end of the school year, students will be able to:

- Work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.
- Understand the meaning of the derivative in terms of a rate of change and local linear approximation, and use derivatives to solve a variety of problems.
- Interpret the meaning of the definite integral both as a limit of Riemann sums and 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.

- 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.
- 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.

TEACHING STRATEGIES:

Classroom interaction is emphasized. Instead of one-way teaching, students will be challenged with problems and encouraged to come up with their own solutions. Group discussion will sometimes be organized and each group will then be invited to present the solution to the class. Students will be encouraged to discover the richness of meaning and idea behind an equation or problem solving technique. Each student will have the opportunity to present and explain her or his idea on the board to their classmates. When they present their ideas or solutions on the board, they will be communicating mathematics both verbally and in written sentences.

For student activities, students in each group work together and present their conclusions in a single paper that should emphasize justifications of the mathematics and quality of the presentation. The paper concludes with a student reflection on how confident they are in sharing their knowledge on these topics.

Through this kind of discussions and activities, students will have the opportunity to work with functions in a variety of ways - graphically, numerically, analytically and verbally. Most importantly, connections among these representations will be emphasized, and students will be expected to relate the various representations to each other. It's important for students to understand that graphs and tables are not always sufficient to prove an idea. Analytic argument is usually required for verification purpose.

PRIMARY TEXTBOOKS AND OTHER RESOURCES:

Hass, Heil, Bogacki, Weir, *Thomas' Calculus: Early Transcendentals*, 15th Edition, Pearson.

The required online textbook companion is the Pearson MyMathLab site: *https://www.pearsonmylabandmastering.com/northamerica/mymathlab/*

College Board MyAP Practice: *https://myap.collegeboard.org/*

Finney, Demana, Waits, Kennedy, and Bressoud, *Calculus (AP* Edition) - Graphical, Numerical, Algebraic,* 5th edition, Pearson.

GRADING SYSTEM/ASSESSMENT:

Students will be assessed with classroom participation, homework, quiz and quarter exams. Homework includes 5 to 10 problems per day during weekdays and 20 review problems for weekends. Weekly quizzes will help identify any weakness students may have, and which topics need additional enhancement. Quarter Exams will be given at the end of each quarter. To help students better prepared for the AP exam, old AP exam problems will be incorporated into homework and quarter exams.

TECHNOLOGY RESOURCES- GRAPHING CALCULATOR:

Graphing calculators, Ti-*nspire CX* (non-CAS), will be used to enhance the learning experience. Students will learn to use graphing calculators to help solve problems, interpret results, and support conclusions.

ADDITIONAL INFORMATION:

Please always check Google Classroom for homework and announcements.

ACADEMIC DISHONESTY:

Academic Dishonesty means employing a method or technique or engaging in conduct in an academic endeavor that contravenes the standards of ethical integrity expected at DIS.

Academic dishonesty includes but is not limited to the following:

- Purposely incorporating the ideas, words of sentences, paragraphs, or parts thereof without appropriate acknowledgment and representing the product as one's work;
- Representing another's intellectual work, such as photographs, paintings, drawings, sculpture, research, or the like, as one's own, including failure to attribute content to an AI.
- Employing a tutor, using Artificial Intelligence without acknowledgment, getting a parent to write a paper or do an assignment, and paying for an essay to be written by someone else and presented as the student's work.
- Committing any act that a reasonable person would conclude, when informed of the evidence, to be a dishonest means of obtaining or attempting to obtain credit for academic work.

Any act of academic dishonesty will result in an automatic zero on the entire assignment/learning task.

COURSE PLANNER:

The following represents the topics covered in this course.

First Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
Week 1 (August 12 to 15) **4 days of class** 12-General Assembly at the Gymnasium 15-Opening Mass & Assumption of Our Lady	Pre-calculus Review • Functions and Their Graphs • Combining Functions • Shifting and Scaling Graphs • Power Functions • Trigonometric Functions

Week 2 (August 18 to 22) 18-St. Dominic de Guzman Feast Day Celebration) Integrated during the Monday Assembly 20- House Shirt & Blue Jeans Day Starts 22- Club Orientation and Club Sign-up	Pre-calculus Review • Exponential Functions • Inverse Functions • Logarithmic Functions • Inverse Trigonometric Functions
Week 3 (August 25 to 29) 27- High School Talk - "Kickstart Your Success: Winning Mindsets for a Great School Year" 29- First Club Meeting	Limits and Continuity • Introducing Calculus: Can Change Occur at an Instant? • Defining Limits and Using Limit Notation • Estimating Limit Values from Graphs • Estimating Limit Values from Tables • Determining Limits Using Algebraic Properties of Limits • Determining Limits Using Algebraic Manipulation • Selecting Procedures for Determining Limits • Determining Limits Using the Squeeze Theorem • Connecting Multiple Representations of Limits
Week 4 (September 1 to 5) 1- Launching of the World Day of Prayer for the Care of Creation (During the Monday Assembly) 1-AP Registration 3- AEO Fall University Fair 5- House Ceremony	Limits and Continuity • Exploring Types of Discontinuities • Defining Continuity at a Point • Confirming Continuity over an Interval • Removing Discontinuities • Connecting Infinite Limits and Vertical Asymptotes • Connecting Limits at Infinity and Horizontal Asymptotes • Working with the Intermediate Value Theorem (IVT)
Week 5 (September 8 to 12) 8- Holy Mass: Nativity of the Blessed Virgin Mary & VIP Induction 10- House Mini Games Start	Differentiation: Definition and Basic Derivative Rules • Defining Average and Instantaneous Rates of Change at a Point

	• Defining the Derivative of a Function and Using Derivative Notation • Estimating Derivatives of a Function at a Point • Connecting Differentiability and Continuity: Determining When Derivatives Do and Do Not Exist
Week 6 (September 15 to 19) 15- Catholic Bridge Program for all New Students (After the Monday Assembly at the Gymnasium) 19- Athletics / Sports Orientation 19- PSAT/NMSQT Registration deadline	Differentiation: Definition and Basic Derivative Rules • Applying the Power Rule • Derivative Rules: Constant, Sum, Difference, and Constant Multiple • Derivatives of cos *x*, sin *x*, e^x and ln *x*
Week 7 (September 22 to 26) 22- Celebration of the International Day of Peace-Peace Pole Ceremony (During the Monday Assembly) Teacher's Day Celebration & 26- Teachers' Appreciation 26- Grade 12 Career Educational Trip 24 to 26-Pre-Exam Days	Differentiation: Definition and Basic Derivative Rules • The Product Rule • The Quotient Rule • Finding the Derivatives of tan *x*, cot *x*, sec *x*, and csc *x* Functions
Week 8 (September 29 to October 3) 29- Launching of the Month of the Holy Rosary (During the Monday Assembly) Oct. 1-2- First Quarter Exam (half day)	Review • Limit and Continuity • Differentiation: Definition and Basic Derivative Rules • 1st Quarter Exam
Oct. 3-DIS Teachers and Staff Recognition Day/ Record Day *Recollection for Aunties and Uncles (no classes for students)*	

Second Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
6-Moon Festival (no classes)	

7-9 Teacher's Conference (no classes)	
Week 1 (11) (October 13 to 17) 13- Second Quarter Begins 13- Start of New Applicant Enrollment for 2nd Semester 14- Visit of Mother Mary to Classrooms (During the morning prayer) 15- AP Exam Only Registration Deadline 15- Monthly Career Talk - College Prep 17- PSAT/NMSQT Digital Exam	Differentiation: Composite, Implicit, and Inverse Functions • The Chain Rule • Implicit Differentiation • Differentiating Inverse Functions
Week 2 (12) (October 20 to 24) 20- Jubilee: Marian Exhibit Opening (After the Monday Assembly) 20- Campus Safety Talk for Students 24- Book Fair (Senior Escape Room)	Differentiation: Composite, Implicit, and Inverse Functions • Differentiating Inverse Trigonometric Functions • Selecting Procedures for Calculating Derivatives • Calculating Higher-Order Derivatives
Week 3 (13) (October 27 to 31) 29- Grade 11 Career Educational Trip Oct. 31 to Nov. 1- Gr.6 SEL Camp	Contextual Applications of Differentiation • Interpreting the Meaning of the Derivative in Context • Straight-Line Motion: Connecting Position, Velocity, and Acceleration • Rates of Change in Applied Contexts Other Than Motion • Introduction to Related Rates
Week 4 (14) (November 3 to 7) 3- Feast of St. Martin de Porres Mass (integrated during the Monday Assembly) 5- Monthly Career Talk - College Prep	Contextual Applications of Differentiation • Solving Related Rates Problems • Approximating Values of a Function Using Local Linearity and Linearization • Using L'Hospital's Rule for Determining Limits of Indeterminate Forms
Week 5 (15) (November 10 to 14) 14- Health Week 14- VIP-Parent Learning Community	Analytical Applications of Differentiation • Using the Mean Value Theorem

	• Extreme Value Theorem, Global Versus Local Extrema, and Critical Points • Determining Intervals on Which a Function Is Increasing or Decreasing • Using the First Derivative Test to Determine Relative (Local) Extrema • Using the Candidates Test to Determine Absolute (Global) Extrema
Week 6 (16) (November 17 to 21) 17- Launching of Mental Health and Anti-Bullying Month 21- Young Shakespeare Play Writing and Performing Contest	Analytical Applications of Differentiation • Determining Concavity of Functions over Their Domains • Using the Second Derivative Test to Determine Extrema • Sketching Graphs of Functions and Their Derivatives • Connecting a Function, Its First Derivative, and Its Second Derivative • 2nd Quarter Exam
Week 7 (17) (November 24 to 28) 24- Peace Pole Day (Monday Assembly) 24- Lighting of the Christmas Tree after school (Campus Min/ ECA/ D' Torch Orchestra/ Religious Studies) (Afternoon) 25-27- Pre-Exam Days 27- Thanksgiving Potluck after school for teachers and staff 27- Thanksgiving Family Day 28- Gr. 12 Second Quarter Exam	Review • Differentiation: Composite, Implicit, and Inverse Functions • Contextual Applications of Differentiation • Analytical Applications of Differentiation
Nov. 29 Invitation for All: The Jubilee Pilgrimage to Taipei (Saturday)	
Week 8 (18) (December 1 to 5) 1- First Week of Advent: Lighting of First Advent Candle (During the Monday Assembly) 3- Monthly Career Talk - College Prep 5- Nativity Play (Collaboration with Campus Ministry) 5- Christmas Fair Whole Day	Analytical Applications of Differentiation • Introduction to Optimization Problems • Solving Optimization Problems • Exploring Behaviors of Implicit Relations
Week 9 (19)	Integration and Accumulation of Change

(December 8 to 12) 8- Foundation Day Mass, cake ceremony, and Class Party (half day) 8- Solemnity of the Immaculate Conception 8- Second Week of Advent 10- Gr. 12 Advent Immersion 11 and 12- Second Quarter Exam (half day)	• Exploring Accumulations of Change • Approximating Areas with Riemann Sums • Riemann Sums, Summation Notation, and Definite Integral Notation
December 13 Invitation for All: Advent Recollection @DIS (Saturday)	
December 15 to January 2 Christmas Break	

Third Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
January 5- Record Day (No Classes for students)	
Week 1 (20) (January 5 to 9) 5- PSAT 8/9 Registration Starts 6- Third Quarter Begins 7- Monthly Career Talk-College Prep 9- New Year Mass at 8:00	Integration and Accumulation of Change • Riemann Sums, Summation Notation, and Definite Integral Notation • The Fundamental Theorem of Calculus and Accumulation Functions • Interpreting the Behavior of Accumulation Functions Involving Area • Applying Properties of Definite Integrals • The Fundamental Theorem of Calculus and Definite Integrals
Week 2 (21) (January 12 to 16) 16- Club Orientation & Sign Up	Integration and Accumulation of Change • Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation • Integrating Using Substitution • Integrating Functions Using Long Division and Completing the Square

Week 3 (22) (January 19 to 23) 19-23- Individual Yearbook Photoshoot for Students 19-23- Career Awareness Week 22- Grade 9 Career Educational trip 23- First Club Meeting for 2nd Semester	Integration and Accumulation of Change • Selecting Techniques for Antidifferentiation Applications of Integration • Finding the Average Value of a Function on an Interval • Connecting Position, Velocity, and Acceleration of Functions Using Integrals • Using Accumulation Functions and Definite Integrals in Applied Contexts
Week 4 (23) (January 26 to 30) 26- Feast Day of St. Thomas Aquinas/Launching of the Catholic Week 26-28- Aquinas Conference: Science and Faith 26-30- Catholic Week Activities 30- DYM Charity Concert	Applications of Integration • Finding the Area Between Curves Expressed as Functions of *x* • Finding the Area Between Curves Expressed as Functions of *y* • Finding the Area Between Curves That Intersect at More Than Two Points
Week 5 (24) (February 2 to 6) 1-4- WASC Mid-Cycle Visit 4- Monthy Career Talk - College Prep 6-7- SUAO Recollection for MS	Applications of Integration • Volumes with Cross Sections: Squares and Rectangles • Volumes with Cross Sections: Triangles and Semicircles • Volume with Disc Method: Revolving Around the *x*- or *y*-Axis • Volume with Disc Method: Revolving Around Other Axes
Week 6 (25) (February 9 to 13) 9- Start of New Applicant Enrollment for 1st Semester for SY2025-26 13- PSAT 8/9 Registration Deadline 13- House Valentine's Mini Fair	Applications of Integration • Volume with Disc Method: Revolving Around Other Axes • Volume with Washer Method: Revolving Around the *x*- or *y*-Axis

13- Chinese New Year Celebration	• Volume with Washer Method: Revolving Around Other Axes
February 16-20 Chinese New Year Holiday	
Week 7 (26) (February 23 to 26) 23-26- IOWA Assessments 23- Student Council Application 24-26- Pre-Exam Days	Differential Equations • Modeling Situations with Differential Equations • Verifying Solutions for Differential Equations • Sketching Slope Fields • Reasoning Using Slope Fields
February 27 Memorial Day Holiday (no classes)	
Week 8 (27) (March 2 to 6) 3- Monthly Career Talk - College Prep 6- PSAT 8/9 System Installation and Practice Test	Differential Equations • Finding General Solutions Using Separation of Variables • Finding Particular Solutions Using Initial Conditions and Separation of Variables • Exponential Models with Differential Equations
Week 9 (28) (March 9 to 13) 13 and 16- Third Quarter Exam (half day)	Review • Integration and Accumulation of Changes • Applications of Integration • Differential Equations • 3rd Quarter Exam

Fourth Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
Week 1 (29) (March 16 to 20) 16- Third Quarter Exam (half day) 16-20- Faculty & Staff Yearbook	Review • Barron's Prep: Chapter 2 Limit and Continuity

Photo 17- Fourth Quarter Begins 18-21- EARCOS Teachers' Conference 19- Lectio Divina and Feast of St. Joseph 20- Parents Learning Community Meeting 20- Kindilympics 20-House Movie Night and Club Fair	• Barron's Prep: Chapter 3 Differentiation
March 21 (Saturday) Spring Fair	
Week 2 (30) (March 23 to 27) 23-27 Student Leaders Applicant Interviews 26- Annual Visit to World Religion Museum Gr. 11 27- Lower School Readers Theatre	Review • Barron's Prep: Chapter 4 Applications of Differential Calculus • Barron's Prep: Chapter 5 Anti-Differentiation
March 30 to April 6 Easter/Spring Break	
Week 3 (31) (April 7 to 10) 7- Spring University Fair 9- Easter Mass 9- Easter Egg Hunt for Lower School Students	Review • Barron's Prep: Chapter 6 Definite Integrals • Barron's Prep: Chapter 7 Applications of Integration to Geometry
Week 4 (32) (April 13 to 17) 13 Laudato Si Month Launching (During the Monday Assembly) 13-30 Laudato Si Month Activities 13-17- Class Photo Taking 17- AP Chinese/Japanese Practice Test	Review • Barron's Prep: Chapter 8 Further Applications of Integration • Barron's Prep: Chapter 9 Differential Equations
Week 5 (33) (April 20 to 24) 20-24 Cultural Awareness Week / Art Exhibit / Earth Week 24- Music Recital 20-24 Student Council Campaign 20-24 AP Mock Exams	Review • Mock Exam
Week 6 (34) (April 27 to 30) 27- Student Council Elections 27-30 Senior Project	Review • Discuss the Mock Exam

Presentations 28-30 Pre-Exam Days	• Concepts covered throughout the year • Specific techniques expected to be mastered for the AP exam • Requirements and expectations in taking the AP exam • Practice Exam I
May 1: Labor Day Public Holiday	
Week 7 (35) (May 4 to 8) 4- May Crowning & Mother's Day Celebration (During the Monday Assembly) 4-14 Final Exams (K, Gr. 5, 8, & 12 Only) 4-15 AP Exams	Review • Discuss Practice Exam I • Concepts covered throughout the year • Specific techniques expected to be mastered for the AP exam • Requirements and expectations in taking the AP exam • Practice Exam II
Week 8 (36) (May 11 to 15) 13 and 14- Fourth Quarter Exam—Undergraduate (half day) 14-16 Student Leaders Retreat Days	AP exam- May 11 (8:00-12:00)
May 15 Record Day (No Classes for students) *Final Deliberation for Graduating/Promoting Classes*	
Week 9 (37) (May 18 to 22) 18- Gr. 5 Recollection & Mass 19- Gr. 8 Recollection & Mass 20- Gr. 12 Recollection 20- Baccalaureate Mass (Whole School) 18-21 WIDA Testing 19- Lower School Sports Day / Gr. 6 & 7 School Field Trip 19- Gr. 9 - 11 - "Senior Success Forum: Inspiring the Next Generation" 19-22 Student Clearance Days 21- Middle & High School Sports Day 21- High School Field Trip 22- House Culminating Activity 20-22 Final Deliberation for Non-Graduating Classes 22- Student Leaders One Day	Clearance and Graduation Preparation

Recollection / Turn Over Ceremony	
Week 10 (38) (May 25 to 29) 25- Kindergarten Graduation/Gr. 5 Promotion 26- LS Field Trip 26- Gr. 8 Graduation and Gr. 12 Graduation 27- Pre-Kindergarten & Gr. 1 - 4, 6 & 7, 9-11 Recognition Last Day of School, Report Card 28- Distribution, & Class Party (half day) 29- Last day for Teachers/Staff Meeting	Clearance and Graduation Preparation

"Kindling the Light of Faith, Hope, and Love: The Legacy of St. Dominic de Guzmán"