Dominican International School
台北市私立道明外僑學校
No. 76, Dazhi Street, Taipei (104042), Taiwan, R.O.C.
10464 臺北市中山區大直街 76 號

COURSE SYLLABUS

School Year	2025 - 2026
Subject	Calculus
Grade Level	12
Teacher	Ms. Yvonne Lee
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COURSE DESCRIPTION:
This course aims to introduce the two main branches of calculus: differential calculus and integral calculus. Initially, the course will review the students on pre-calculus concepts. This is important for the study of limits and its properties. Limits will then be used to define the basic definitions of the two main branches of calculus. Applications of the concepts taught will be supplied to give the students an idea of how to recognize or design applications in future experiences.

COURSE OBJECTIVES: By the end of the semester/school year, (SWAT) Students will be able to:

Standard 1 Limits and Continuity
Students understand the concept of limit, find limits of functions at points and at infinity, decide if a function is continuous, and use continuity theorems.

C.1.1 Understand the concept of limit and estimate limits from graphs and tables of values.
C.1.2 Find limits by substitution.
C.1.3 Find limits of sums, differences, products, and quotients.
C.1.4 Find limits of rational functions that are undefined at a point.
C.1.5 Find one-sided limits.
C.1.6 Find limits at infinity.
C.1.7 Decide when a limit is infinite and use limits involving infinity to describe asymptotic behavior.
C.1.8 Find special limits
C.1.9 Understand continuity in terms of limits.
C.1.10 Decide if a function is continuous at a point.
C.1.11 Find the types of discontinuities of a function.
C.1.12 Understand and use the Intermediate Value Theorem on a function over a closed interval.
C.1.13 Understand and apply the Extreme Value Theorem: If $f(x)$ is continuous over a closed interval, then f has a maximum and a minimum on the interval.

Standard 2 Differential Calculus
Students find derivatives of algebraic, trigonometric, logarithmic, and exponential functions. They find derivatives of sums, products, and quotients, and composite and inverse functions. They find derivatives of higher order, and use logarithmic differentiation and the Mean Value Theorem.

C.2.1 Understand the concept of derivative geometrically, numerically, and analytically, and interpret the derivative as a rate of change.
C.2.2 State, understand, and apply the definition of derivative.
C.2.3 Find the derivatives of functions, including algebraic, trigonometric, logarithmic, and exponential functions.
C.2.4 Find the derivatives of sums, products, and quotients.
C.2.5 Find the derivatives of composite functions, using the chain rule.
C.2.6 Find the derivatives of implicitly-defined functions.
C.2.7 Find second derivatives and derivatives of higher order.
C.2.8 Find derivatives using logarithmic differentiation.
C.2.9 Understand and use the relationship between differentiability and continuity.
C.2.10 Understand and apply the Mean Value Theorem.

Standard 3 Applications of Derivatives
Students find slopes and tangents, maximum and minimum points, and points of inflection. They solve optimization problems and find rates of change.

C.3.1 Find the slope of a curve at a point, including points at which there are vertical tangents and no tangents.
C.3.2 Find a tangent line to a curve at a point and a local linear approximation.
C.3.3 Decide where functions are decreasing and increasing. Understand the relationship between the increasing and decreasing behavior of f and the sign of f'.
C.3.4 Find local and absolute maximum and minimum points.
C.3.5 Analyze curves, including concavity.
C.3.6 Find points of inflection of functions. Understand the relationship between the concavity of f and the sign of f''. Understand points of inflection as places where concavity changes.
C.3.7 Use first and second derivatives to help sketch graphs. Compare the corresponding characteristics of the graphs of *f*, *f'*, and *f''*.
C.3.8 Solve optimization problems.
C.3.9 Find average and instantaneous rates of change. Understand the instantaneous rate of change as the limit of the average rate of change. Interpret a derivative as a rate of change in applications, including velocity, speed, and acceleration.
C.3.10 Find the velocity and acceleration of a particle moving in a straight line.
C.3.11 Model rates of change, including related rates problems.

Standard 4 Integral Calculus
Students define integrals using Riemann Sums, use the Fundamental Theorem of Calculus to find integrals, and use basic properties of integrals. They integrate by substitution and find approximate integrals.

C.4.1 Use rectangle approximations to find approximate values of integrals.
C.4.2 Calculate the values of Riemann Sums over equal subdivisions using left, right, and midpoint evaluation points.
C.4.3 Interpret a definite integral as a limit of Riemann Sums.
C.4.4 Understand the Fundamental Theorem of Calculus: Interpret a definite integral of the rate of change of a quantity over an interval as the change of the quantity over the interval.
C.4.5 Use the Fundamental Theorem of Calculus to evaluate definite and indefinite integrals and to represent particular antiderivatives. Perform analytical and graphical analysis of functions so defined.
C.4.6 Understand and use these properties of definite integrals.
C.4.7 Understand and use integration by substitution (or change of variable) to find values of integrals.
C.4.8 Understand and use Riemann Sums, the Trapezoidal Rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, and by tables of values.

Standard 5 Applications of Integration
Students find velocity functions and position functions from their derivatives, solve separable differential equations, and use definite integrals to find areas and volumes.

C.5.1 Find specific antiderivatives using initial conditions, including finding velocity functions from acceleration functions, finding position functions from velocity functions, and applications to motion along a line.
C.5.2 Solve separable differential equations and use them in modeling.
C.5.3 Use definite integrals to find the area between a curve and the x-axis, or between two curves.
C.5.4 Use definite integrals to find the average value of a function over a closed interval.
C.5.5 Use definite integrals to find the volume of a solid with known cross-sectional area.

PRIMARY TEXTBOOKS AND OTHER RESOURCES:

Students are responsible for coming to class prepared with all the required supplies. Laptops or equivalent devices are permitted for some activities based on Teacher's instructions.

- Textbook – Hass, Heil and Weir. Thomas' Calculus: Early Transcendentals, 15th ed. In SI units, 2024.
- Khan Academy

GRADING SYSTEM/ASSESSMENT:

1. Tests and Pop Quizzes	30%
2. Homework/Classwork/Seatwork /Projects	30%
3. Quarterly Exam	30%
4. Deportment	10%
Total Grade	100%

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.

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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	**1.1 Functions and Their Graphs**
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	**1.2 Combining Functions; Shifting and Scaling Graph** **1.3 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	**1.4 Graphing with Software** **1.5 Exponential Functions**
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	**1.6 Inverse Functions and Logarithms**
Week 5 (September 8 to 12) 8- Holy Mass: Nativity of the Blessed Virgin Mary & VIP Induction 10- House Mini Games Start	**Chapter 1 Test** **2.1 Rates of Change and Tangent Lines to Curves**
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	**2.2 Limit of a Function and Limit Laws** **2.3 The Precise Definition of a Limit**
Week 7 (September 22 to 26)	**2.4 One-Sided Limits** **2.5 Continuity**

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	
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)	**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	**2.6 Limits Involving Infinity; Asymptotes of Graphs**
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)	**3.1 Tangent Lines and the Derivative at a Point** **3.2 The Derivative as a Function**

Week 3 (13) (October 27 to 31) 29- Grade 11 Career Educational Trip Oct. 31 to Nov. 1- Gr.6 SEL Camp	**3.3 Differentiation Rules**
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	**3.4 The Derivative as a Rate of Change** **3.5 Derivatives of Trigonometric Functions**
Week 5 (15) (November 10 to 14) 14- Health Week 14- VIP-Parent Learning Community	**3.6 The Chain Rule**
Week 6 (16) (November 17 to 21) 17- Launching of Mental Health and Anti-Bullying Month 21- Young Shakespeare Play Writing and Performing Contest	**3.7 Implicit Differentiation**
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	**Quarter Exam**
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	**Project**
Week 9 (19) (December 8 to 12)	**Project**

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)	
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	**4.1 Extreme Value of Functions on Closed Intervals**
Week 2 (21) (January 12 to 16) 16- Club Orientation & Sign Up	**4.2 The Mean Value Theorem**
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	**4.3 Monotonic Functions and the First Derivative Test**
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	**4.4 Concavity and Curve Sketching**

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	**4.4 Concavity and Curve Sketching**
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 13- Chinese New Year Celebration	**4.6 Applied Optimization**
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	**4.7 Newton's Method**
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	**4.8 Antiderivatives**
Week 9 (28) (March 9 to 13) 13 and 16- Third Quarter Exam (half day)	**Quarter Exam**

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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 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	**5.1 Area and Estimating with Finite Sums**
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	**5.2 Sigma Notation and Limits of Finite Sums**
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	**5.2 Sigma Notation and Limits of Finite Sums**
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	**5.3 The Definite Integral**
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	**5.4 The Fundamental Theorem of Calculus**

Week 6 (34) (April 27 to 30) 27- Student Council Elections 27-30 Senior Project Presentations 28-30 Pre-Exam Days	**5.6 Definite Integral Substitutions and the Area Between Curves**
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	**Quarter Exam**
Week 8 (36) (May 11 to 15) 13 and 14- Fourth Quarter Exam—Undergraduate (half day) 14-16 Student Leaders Retreat Days	**Graduation Preparation**
May 15 Record Day (No Classes for students) *Final Deliberation for Graduating/Promoting Classes*	
Week 9 (37) (May 18 to 22)	**Graduation Preparation** 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 Recollection / Turn Over Ceremony
Week 10 (38) (May 25 to 29)	**Graduation Preparation** 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