



COURSE SYLLABUS

School Year	2026 - 2027
Subject	Calculus
Grade Level	12
Teacher	Ms. Yvonne Lee
Email	ylee@dishs.tp.edu.tw

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



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GRADING SYSTEM/ASSESSMENT:

1. Tests and Pop Quizzes	30%
2. Homework/Classwork/Seatwork /Projects	30%
3. Quarterly Exam	30%
4. Deportment	<u>10%</u>
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 (Aug 11-14) <u>4 days of class</u> 11 Morning Assembly 14 Opening Mass & Assumption of Our Lady 8:00	1.1 Functions and Their Graphs
Week 2 (Aug 17-21)	1.2 Combining Functions: Shifting and Scaling Graph 1.3 Trigonometric Functions
Week 3 (Aug 24-28)	1.4 Graphing with Software 1.5 Exponential Functions
Week 4 (Aug 31-Sep 4)	1.6 Inverse Functions and Logarithms
Week 5 (Sep 7-11) 7 Holy Mass 8:00	Chapter 1 Test 2.1 Rates of Change and Tangent Lines to Curves
Week 6 (Sep 14-18)	2.2 Limit of a Function and Limit Laws 2.3 The Precise Definition of a Limit
Week 7 (Sep 21-25) 22-24 Pre-Exam Days 25 Moon Festival (Public Holiday)	2.4 One-Sided Limits 2.5 Continuity
Week 8 (Sep 28-Oct 2) Sep 28 Confucius Day (Public Holiday) Oct 1-2 First Quarter Exam (half day)	Quarter Exam
Week 9 (Oct 5-9)	Teacher's Conference (Oct 6-8) 5 Record Day (Student Holiday) 6 Teachers Conference Mass (Student Holiday) 9 Double 10 (Public Holiday)



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Second Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
Week 1 (10) (Oct 12-16)	2.6 Limits Involving Infinity; Asymptotes of Graphs
Week 2 (11) (Oct 19-23)	3.1 Tangent Lines and the Derivative at a Point 3.2 The Derivative as a Function
Week 3 (12) (Oct 26-30) 25-26 Retrocession Day (Public Holiday)	3.3 Differentiation Rules
Week 4 (13) (Nov 2-6) 2 All Soul's Day Mass 8:00	3.4 The Derivative as a Rate of Change 3.5 Derivatives of Trigonometric Functions
Week 5 (14) (Nov 9-13)	3.6 The Chain Rule
Week 6 (15) (Nov 16-20)	3.7 Implicit Differentiation
Week 7 (16) (Nov 23-27) 24-26 Pre-Exam Days 27 G12 Second Quarter Exam	Quarter Exam
Week 8 (17) (Nov 30-Dec 4) 30 G12 Second Quarter Exam	Project
Week 9 (18) (Dec 7-11) 8 Foundation Day Mass 9:00, Cake Ceremony, Christmas Fair (Whole day) 10-11 Second Quarter Exam (half day)	Project
Dec 14 to Jan 1 Christmas Break	



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Third Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
Week 1 (19) (Jan 4-8) 4 Record Day (Student Holiday) 8 New Year Mass 8:00	4.1 Extreme Value of Functions on Closed Intervals
Week 2 (20) (Jan 11-15)	4.2 The Mean Value Theorem
Week 3 (21) (Jan 18-22)	4.3 Monotonic Functions and the First Derivative Test
Week 4 (22) (Jan 25-29) 28 Feast Day of St. Thomas Aquinas	4.4 Concavity and Curve Sketching
Week 5 (23) (Feb 1-5) 4-5 Little New Year's Eve (Public Holiday)	4.4 Concavity and Curve Sketching
<i>Feb 5-12 Chinese New Year Holiday</i>	
Week 6 (24) (Feb 15-19)	4.4 Concavity and Curve Sketching
Week 7 (25) (Feb 22-26) 22-26 IOWA Assessments	4.6 Applied Optimization
Week 8 (26) (Mar 1-5) 1 Memorial Day (Public Holiday) 2-4 Pre-Exam Days	4.7 Newton's Method
Week 9 (27) (Mar 8-12)	4.8 Antiderivatives
Week 10 (28) (Mar 15-19)	Quarter Exam



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Week 11 (29) (Mar 22-26) 23-24 Third Quarter Exam (half day) 25-26 Easter Break (Spring Break)	23-24 Third Quarter Exam (No Class) 25-26 Easter Break (No Class)
<i>Mar 25-Apr 2 Easter & Spring Break</i>	

Fourth Quarter Tentative Course Content

Week/Date	Topic/Projects/Assessments
Week 1 (30) (Apr 5-9) 5 Tomb Sweeping Day (Public Holiday) 6 Children's Day (Public Holiday)	5.1 Area and Estimating with Finite Sums
Week 2 (31) (Apr 12-16)	5.1 Area and Estimating with Finite Sums 5.2 Sigma Notation and Limits of Finite Sums
Week 3 (32) (Apr 19-23) 19-23 AP Mock Exams	5.2 Sigma Notation and Limits of Finite Sums
Week 4 (33) (Apr 26-30) 27-29 Pre-Exam Days 30 Labor Day (Public Holiday)	5.3 The Definite Integral
Week 5 (34) (May 3-7) 3-7 Final Exams (K, G5, 8, & 12) 3-14 AP Exams	5.4 The Fundamental Theorem of Calculus



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Week 6 (35) (May 10-14) 3-14 AP Exams 12-13 Fourth Quarter Exam- Undergraduate (half day) 14 Record Day (Student Holiday)	Quarter Exam
Week 7 (36) (May 17-21) 17 G12 Recollection (Morning) 17 Baccalaureate Mass (Afternoon, Schoolwide) 19 House Sports Day 20 High School Field Trip 21 House Culminating Activity 17-21 Student Clearance Days & Special Events	Clearance and Graduation Preparation
Week 8 (37) (May 24-28) 24 Middle & High School Sports Day 24 LS Field Trip 25 Kindergarten Graduation/G5 Promotion 26 G8 Graduation and G12 Graduation 27 Pre-Kindergarten & G1-4, 6 & 7, 9-11 Recognition 28 Last day of School for Students 31 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”