

Rumson-Fair Haven Regional High School

Course: *Honors College Calculus*

Staff Writers: Lauren Garrido and Kristin McCarthy

Supervisor: Jon Pennetti

Board Approval: September 2022

Revision Approval: February 2025

Section I: Course Description

Honors College Calculus is primarily concerned with developing the student's understanding of the concepts of Calculus and providing experiences with its methods and applications. The course emphasizes a multi-representational approach to Calculus, with concepts, results, and problems being expressed graphically, numerically, analytically (algebraically), and verbally. The connections among these representations are also important. Broad concepts and widely applicable methods are emphasized. The focus of the course is neither manipulation nor memorization of an extensive taxonomy of functions, curves, theorems, or problem types. Although facilities with manipulation and computational competence are important outcomes, they are not the core of this course. Technology will be used regularly by students to reinforce the relationships among multiple representations of functions, to confirm written work, to implement experimentation, and to assist in interpreting results.

Section II: NJSLs: New Jersey Student Learning Standards/Learning Objectives

1. [2023 New Jersey Student Learning Standards – Mathematics:](#)

- “A New Jersey education in Mathematics builds quantitatively and analytically literate citizens prepared to meet the demands of college and career, and to engage productively in an information-driven society; ...A high-quality mathematics education fosters a population that...leverages data in decision-making and as a lens for discussing, analyzing, and responding to practical questions, persists to make sense of and model problems arising in everyday life, society, and the workplace, thinks critically and strategically to assess quantitative relationships and to solutions to complex problems, employs precise reasoning and constructs viable arguments to deduce conclusions, recognize false statements and assess peers' reasoning, interprets, evaluates and critiques the mathematics embedded in social, scientific and commercial systems, as well as the claims made in the private and public sectors, communicates precisely when conveying, representing, and justifying both qualitative and quantitative perspectives.”

2. [2023 New Jersey Student Learning Standards English Language Arts:](#)

- A New Jersey education in English Language Arts builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. ...Students will develop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language read rich, challenging texts that build their knowledge of the world, grow their confidence and identities as readers, and develop critical thinking skills and vocabulary necessary for long-term success[; e]ngage in regular, meaningful, writing authentic tasks, exploring valued topics, writing for impact and expression, and sharing their work with others (including authentic audiences) leverage complex texts and digital media to develop comprehension, active listening, and discussion skills ground daily writing and discussion in evidence, fostering an ability to read critically, build arguments, cite evidence, and communicate ideas to contribute meaningfully as productive citizens evaluate the reliability, credibility, and perspective of authors and speakers across all forms of media express ideas and knowledge through a variety of modalities and media, and serve as effective communicators who purposefully read, write, and speak across multiple disciplines [and l]earn to persist in reading complex texts, establishing lifelong habits to read voluntarily for pleasure, for further education, for information on public policy, and for advancement in the workplace.

3. [Standard 8.1 \(Computer Science\) and 8.2 \(Design Thinking\) of the 2020 NJSLs:](#)

- “The ‘Intent and Spirit of the Computer Science and Design Thinking Standards’ is to focus on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.”

4. [Standard 9.4 \(Life Literacies and Key Skills\) of the 2020 NJSLs:](#)

- “This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.”
- **Climate Change:** The state of New Jersey has mandated instruction in, “Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to

develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs.”

5. **[*Amistad Law: N.J.S.A. 18A 52:16A-88:](#)**
 - The inclusion of lessons and resources/texts dealing with the African slave trade, slavery in America, the vestiges of slavery in this country and the contributions of African Americans to our society will be implemented in English and Social Studies courses in accordance with state law: “Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.”
6. **[*Holocaust Law: N.J.S.A. 18A 35-28:](#)**
 - The inclusion of lessons and resources/texts that enable pupils to identify and analyze applicable theories concerning human nature and behavior; to understand that genocide is a consequence of prejudice and discrimination; and to understand that issues of moral dilemma and conscience have a profound impact on life will be implemented in English and Social Studies courses in accordance with state law: “Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.”
7. **[*LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35:](#)**
 - A transformative approach to the inclusion of lessons and resources/texts on the contributions and issues concerning the LGBTQ+ population and people with disabilities will be implemented across all core subjects in accordance with state law: “A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district’s implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.”
8. **[*Asian American and Pacific Islanders Legislation: N.J.S.A 4021/A6100:](#)**
 - The inclusion of lessons and resources/texts on the history and contributions of Asian Americans and Pacific Islanders, will enable New Jersey’s schools to provide a curriculum that reflects the diversity of our state. In accordance with state law: “A board of education shall include instruction on the history and contributions of Asian Americans and Pacific Islanders in an appropriate place in the curriculum of students in grades kindergarten through as part of the school district’s implementation of the New Jersey Student Learning Standards in Social Studies.”
9. Acquisition/development/refinement of the higher-order critical thinking skills aligned with the *Revised Bloom’s Taxonomy of Cognitive Objectives*

Section III: Curriculum Modifications

The *Honors College Calculus* curriculum is subject to case-by-case modifications to support/advance the needs of all students, including special education students, English language learners, gifted students and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district’s English Language Learners (ELL) coordinator, feedback from members of the Intervention & Referral Services Team (*I&RS*) for at-risk students, and 504 Plans.

Coursework and assessments will be modified on an individual basis for students when necessary. Modifications may include but are not limited to those outlined on the [Modifications/Accommodations for Mathematics Courses](#) chart.

Section IV: Preparation for Standardized Testing

Instruction in *Honors College Calculus* is aligned with the requirements of state and national standardized assessments, including the *NJGPA*, *NJSLSA*, the *ACT*, the *PSAT* and the *SAT*.

Section V: Curriculum Pacing Guide

Curriculum Pacing Guide	
Course Title: <i>Honors College Calculus</i>	Grade Level: 12

Algebra/PreCalc Review	Weeks 1-5
Unit I: Continuity and Limits as Properties of Functions	Weeks 6-10
Unit II: The Derivative	Weeks 10-15
Unit III: The Derivative in Graphing and Applications	Weeks 16-24
Unit IV: The Integral	Weeks 25-30
Unit V: Methods of Integration	Weeks 31-34
Unit VI: Applications of the Integral in Geometry	Weeks 35-40

Section VI: Technology Skills

Students in *Honors College Calculus* are required to complete the technology skills components of the curriculum:

- Kuta
- Ti-89 Calculator
- Desmos
- Google Sheets
- Google Docs
- Google Classroom

Section VII: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed in *Honors College Calculus*:

- [Common Sense Education](#)
- [Math XL](#)
- Calculus: Graphical, Numerical, Algebraic By: Finney, Demana, Waits, and Kennedy

Section VIII: Grading Formula and Assessment Modes

Marking period grades in *Honors College Calculus* are determined via a percentage weighting model. The specific grading categories and weightings of each will be determined before the start of each academic year and will be published in the posted/distributed course syllabi.

Assessments in *Honors College Calculus* vary greatly in format, scope/content/skills assessed, and alternative assessments, differentiation in assessments and choice will be incorporated as appropriate. Preliminary assessments of each format will be used as benchmarks and summative assessments will be created/revised collaboratively each year and planned by members of the *Honors College Calculus* instructional team to inform future learning and to measure student growth.

Section IX: Unit Templates

The following unit templates have been established for the *Honors College Calculus* curriculum by the *Honors College Calculus* instructional team:

Pre-Unit: Algebra/Precalc Review
Unit Summary
In this unit, students will review important concepts from Algebra and Precalculus that will be necessary for success in this course. The students will be able to construct graphs of major functions and include all necessary components. They will

review all factoring methods and be able to determine which method will be the most effective for a specific problem. Students will evaluate composite functions and determine the inverse of a function. They will be able to write equations of lines when given a point and a slope. Students will review the properties of log and exponential functions, as well as evaluate trigonometric functions.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Honors College Calculus*:

- *2023 New Jersey Student Learning Standards: Mathematics*
 - MP1-8
 - F.IF.B.4 & C.7
- *2023 New Jersey Student Learning Standards English Language Arts*
 - L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.12.DA.5
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
 - 9.4.12.CI.1, 9.4.12.CT.1-2, 9.4.12.TL.3

Unit Essential Questions

- How can various functions be graphed and identified various?
- What factoring technique would be best for each type of expression?
- How can an equation of a line be written given a slope and a point?
- How can the Unit Circle be used to evaluate Trig functions?

Unit Enduring Understandings

- The type of function will be determined based on the setup of the equation and then students will know which characteristics must be shown to sketch an accurate graph.
- When trying to factor an expression, students must choose between regular factoring, difference of squares, grouping, or sum/difference of cubes.
- If the slope of a line and the point which the line passes through can be determined, then an equation of a line in point-slope form can be written.
- To evaluate a trigonometric function, students must determine the quadrant and reference angle to set up the triangle and then use the trig ratio to find the value.

Evidence of Learning

Formative & Alternative Assessments:

- Classwork
- Homework
- Performance activities
- Exit Slips/Graded Warm Ups
- Algebra/Precalc Review Quiz
- Individual student check-ins with teacher

Benchmark & Summative Assessments:

- Review assessment (Benchmark)

Resources Needed:

- *Calculus Graphical, Numerical, Algebraic*, Finney Demana Waits Kennedy (AP Edition)
- Ti-89 Calculator
- Kuta Software
- MathXL

Unit I: Continuity and Limits as Properties of Functions

Unit Summary

In this chapter, students learn how to define and calculate the limits of function values. The students will be able to evaluate limits by substitution, graphical analysis, numerical approximation, or algebra. They will explore infinite limits and determine their connection to end behavior. The students will be able to identify various types of discontinuities and evaluate the one-sided limits at those locations. The students will understand the definition of continuity and determine whether a function is continuous at a certain point.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Honors College Calculus*:

- *2023 New Jersey Student Learning Standards: Mathematics*
 - MP1-8
 - F.IF.B.4 & C.7
- *2023 New Jersey Student Learning Standards English Language Arts*
 - L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.12.DA.5-6
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*

○ 9.4.12.CI.1, 9.4.12.CT.1 & 2, 9.4.12.TL.3		
Unit Essential Questions	Unit Enduring Understandings	
<ul style="list-style-type: none"> • What is a limit? • How can limits be used to describe a function's behavior graphically or analytically? • What does it mean for a function to be continuous? 	<ul style="list-style-type: none"> • Limit describes how a function behaves near a point, instead of at that point. • A limit can be estimated by looking at the graph of a function or by looking at a table of values. Algebraic methods can be used to evaluate the limits of functions, including at points of discontinuity. Limits can be evaluated using direct substitution, factoring and simplifying, or rationalizing. • A function is continuous at a point if the function exists, the limit exists, and the two values are equal. A function is considered to be discontinuous at a point if the one-sided limits do not equal or if the limits do not exist in general. 	
Evidence of Learning		
Formative & Alternative Assessments: <ul style="list-style-type: none"> • Classwork • Homework • Performance activities • Exit Slips/Graded Warm Ups • Functions Quiz • Individual student check-ins with teacher 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> • Limits and Functions Test (Benchmark) 	Resources Needed: <ul style="list-style-type: none"> • <i>Calculus Graphical, Numerical, Algebraic</i>, Finney Demana Waits Kennedy (AP Edition) • Ti-89 Calculator • Kuta Software • MathXL

Unit II: The Derivative		
Unit Summary		
<p>Students learned how to find the slope of a tangent to a curve in Unit I as the limit of the slopes of secant lines. Now, the students will determine the derivative by calculating the instantaneous rate of change of f at any point. Students will apply the slope, product, quotient, and chain rules to differentiate and will use implicit differentiation and be able to find the derivatives of Trigonometric, Logarithmic, Exponential, and Inverse Trigonometric functions. The derivative allows mathematicians to unlock the secrets of planetary motion and gravitational attraction of objects changing position over time.</p>		
Standards/Core Ideas/Performance Expectations		
<p>The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in <i>Honors College Calculus</i>:</p> <ul style="list-style-type: none"> • 2023 New Jersey Student Learning Standards: <i>Mathematics</i> <ul style="list-style-type: none"> ○ MP1-8 ○ F.IF.B.6 • 2023 New Jersey Student Learning Standards <i>English Language Arts</i> <ul style="list-style-type: none"> ○ L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6 • 2020 New Jersey Student Learning Standards: <i>Computer Science and Design Thinking</i> <ul style="list-style-type: none"> ○ 8.1.12.DA.5-6 • 2020 New Jersey Student Learning Standards: <i>Career Readiness, Life Literacies and Key Skills</i> <ul style="list-style-type: none"> ○ 9.4.12.CI.1, 9.4.12.CT.1-2, 9.4.12.TL.3 		
Unit Essential Questions	Unit Enduring Understandings	
<ul style="list-style-type: none"> • What does the derivative give information about? • Where does the derivative not exist? • Why do derivatives of sine and cosine play a key role in describing periodic change? 	<ul style="list-style-type: none"> • Derivatives make connections between the instantaneous rate of change of observed phenomena and the slope of a line drawn tangent to a curve. • Derivatives fail to exist at cusps, corners, and vertical tangents. • Derivatives of sine and cosine play vital roles in understanding the periodic behavior of trig functions and the interpretation of applications in the real-world setting. 	
Evidence of Learning		
Formative & Alternative Assessments: <ul style="list-style-type: none"> • Classwork • Homework • Performance activities • Exit Slips/Graded Warm Ups • Derivative quiz 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> • Derivatives Test 	Resources Needed: <ul style="list-style-type: none"> • <i>Calculus Graphical, Numerical, Algebraic</i>, Finney Demana Waits Kennedy (AP Edition) • Ti-89 Calculator • Kuta Software • MathXL

<ul style="list-style-type: none"> Individual student check-ins with teacher 		
---	--	--

Unit III: The Derivative in Graphing and Applications

Unit Summary

In this unit, the students will solve problems using the derivative graphically and solve optimization problems. Students will build on their work with derivatives and now be able to analyze functions using the First and Second Derivative Tests (intervals of increase/decrease, relative extreme values, concavity, and points of inflection) which will allow them to understand rectilinear motion as well as solve optimization and related rates problems.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Honors College Calculus*:

- *2023 New Jersey Student Learning Standards: Mathematics*
 - MP1-8
 - F.IF.B.6
- *2023 New Jersey Student Learning Standards English Language Arts*
 - L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.12.DA.5-6
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
 - 9.4.12.CI.1, 9.4.12.CT.1-2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings
--------------------------	------------------------------

- | | |
|---|---|
| <ul style="list-style-type: none"> ● How are the maximum/minimum points on a graph found? ● Why is the derivative such a powerful tool for analyzing functions? | <ul style="list-style-type: none"> ● To find the maximum/minimum points on a graph, students need to be able to find the first derivative. Students make connections between the sign of a function’s first and second derivatives at a particular point and the features of the graph of the underlying function. ● Derivatives play a vital role in analyzing functions because students will learn to predict the features of a function’s graph based on the values of its first and second derivatives and vice versa. |
|---|---|

Evidence of Learning

Formative & Alternative Assessments: <ul style="list-style-type: none"> ● Classwork ● Homework ● Performance activities ● Exit Slips/Graded Warm Ups ● Graphing Derivatives quiz ● Optimization and related rates quiz ● Individual student check-ins with teacher 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> ● Unit Assessment 	Resources Needed: <ul style="list-style-type: none"> ● <i>Calculus Graphical, Numerical, Algebraic</i>, Finney Demana Waits Kennedy (AP Edition) ● Ti-89 Calculator ● Kuta Software ● MathXL
--	---	---

Unit IV: Integration

Unit Summary

The focus of this unit will be to give the student a practical understanding of integration. The indefinite integral will be introduced first and then the definite integral to bring out the connection between the derivative and the definite integral in the “Fundamental Theorem of Calculus”. The students will be able to evaluate indefinite and definite integrals and understand what their answer represents.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Honors College Calculus*:

- *2023 New Jersey Student Learning Standards: Mathematics*
 - MP1-8
 - G.CO.C.10-11, G.SRT.C.6-8
- *2023 New Jersey Student Learning Standards English Language Arts*
 - L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
 - 8.1.12.DA.5-6

- 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills
 - 9.4.12.CI.1, 9.4.12.CT.1-2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings
<ul style="list-style-type: none"> ● How are area and integrals related? ● How are integrals and derivatives related? ● What is the “Fundamental Theorem of Calculus”? 	<ul style="list-style-type: none"> ● Area and integrals are related because a definite integral gives us the area between the x-axis and the curve over a defined interval. ● The derivative and the integral are linked in that they are both defined via the concept of the limit. They are inverse operations of each other. ● The “Fundamental Theorem of Calculus” establishes the relationship between the derivative and the integral. It states that the rate of change of the area under the curve up to a point x is equal to the height of the area at the point.

Evidence of Learning

Formative & Alternative Assessments: <ul style="list-style-type: none"> ● Classwork ● Homework ● Performance activities ● Exit Slips/Graded Warm Ups ● Intro to Integration quiz ● Individual student check-ins with teacher 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> ● Definite and Indefinite Integral Test 	Resources Needed: <ul style="list-style-type: none"> ● <i>Calculus Graphical, Numerical, Algebraic</i>, Finney Demana Waits Kennedy (AP Edition) ● Ti-89 Calculator ● Kuta Software ● MathXL
---	---	---

Unit V: Methods of Integration

Unit Summary

In this unit, students will work with differential equations and mathematical modeling. Students will be examining the analytic, graphical, and numerical techniques to calculate integrals. Students will be able to discuss how substitution works with trigonometric functions as well as strategies for computing various types of integrals. They will also be able to use integration by substitution and by parts and evaluate trigonometric integrals.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Honors College Calculus*:

- 2023 New Jersey Student Learning Standards: Mathematics
 - MP1-8
 - G.CO.C.10-11, G.SRT.C.6-8
- 2023 New Jersey Student Learning Standards English Language Arts
 - L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6
- 2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
 - 8.1.12.DA.5-6
- 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills
 - 9.4.12.CI.1, 9.4.12.CT.1-2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings
<ul style="list-style-type: none"> ● How is u-substitution used in Calculus? ● How do is it determined when to use integration by substitution vs. integration by parts? 	<ul style="list-style-type: none"> ● Integration by u-substitution is a method for evaluating integrals and antiderivatives. It is the counterpart to the chain rule and can loosely be thought of as using the chain rule “backwards”. ● Integration by parts is for functions that can be written as the product of another function and a third function's derivative. A good rule of thumb to follow would be to try u-substitution first, and then if you cannot reformulate your function into the correct form, try integration by parts.

Evidence of Learning

Formative & Alternative Assessments: <ul style="list-style-type: none"> ● Classwork ● Homework ● Performance activities ● Exit Slips/Graded Warm Ups ● Integration by Parts quiz ● Integration by Substitution quiz 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> ● Trigonometric Integrals Assessment 	Resources Needed: <ul style="list-style-type: none"> ● <i>Calculus Graphical, Numerical, Algebraic</i>, Finney Demana Waits Kennedy (AP Edition) ● Ti-89 Calculator ● Kuta Software ● MathXL
--	--	---

<ul style="list-style-type: none"> Individual student check-ins with teacher 		
---	--	--

Unit VI: Applications of the Definite Integral in Geometry (Including graphing review)

Unit Summary

In this unit, students will apply the definite integral to prove basic formulas from Geometry. They will explore the integral as net change, and will then use these integrals in applications to find areas and volumes. Students will be able to find the area between two curves, concerning the y-axis, and between curves with multiple intersections. These lessons will allow students to review linear motion in terms of displacement versus total distance while now using integrals.

Standards/Core Ideas/Performance Expectations

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Honors College Calculus*:

- 2023 New Jersey Student Learning Standards: Mathematics
 - MP1-8
 - G.CO.C.10-11, G.SRT.C.6-8
- 2023 New Jersey Student Learning Standards English Language Arts
 - L.VL.11-12.3.A, W.AW.11-12.1.A & E, W.IW.11-12.2.A, W.NW.11-12.3.A-E, SL.II.11-12.2, SL.PI.11-12.4, RI.MF.11-12.6
- 2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
 - 8.1.12.DA.5-6
- 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills
 - 9.4.12.CI.1, 9.4.12.CT.1-2, 9.4.12.TL.3

Unit Essential Questions	Unit Enduring Understandings
--------------------------	------------------------------

<ul style="list-style-type: none"> How can Calculus be used to determine the area between two curves? What is the difference between displacement and total distance traveled? 	<ul style="list-style-type: none"> The area under a curve between two points is determined by doing a definite integral between the two points. To find the area under the curve $y = f(x)$ between $x = a$ & $x = b$, integrate $y = f(x)$ between the limits of a and b. This area can be calculated using integration with given limits. The displacement of a particle moving in a straight line is a vector defined as the change in its position. If the particle moves from the position $x(t_1)$ to the position $x(t_2)$, its displacement is $x(t_2) - x(t_1)$ for the time interval $[t_1, t_2]$. The distance traveled by a particle is the 'actual distance' traveled.
--	---

Evidence of Learning

Formative & Alternative Assessments: <ul style="list-style-type: none"> Classwork Homework Performance activities Exit Slips/ Graded Warm Ups Area between two curves quiz Volume integral quiz Individual student check-ins with teacher 	Benchmark & Summative Assessments: <ul style="list-style-type: none"> Final Unit Assessment 	Resources Needed: <ul style="list-style-type: none"> <i>Calculus Graphical, Numerical, Algebraic</i>, Finney Demana Waits Kennedy (AP Edition) Ti-89 Calculator Kuta Software MathXL
---	---	---

Section X: Unit Reflection

The *Honors College Calculus* instructional team must confer upon the completion of each instructional unit in the *Honors College Calculus* and rate the degrees to which the instructional units meet performance criteria established by the New Jersey Department of Education using the Unit Reflection Form. Completed unit reflection forms must be submitted to the Department Supervisor for approval upon completion of curriculum implementation with a complementing list of suggested modifications to the *Honors College Calculus* curriculum.

Unit Reflection Form: Honors College Calculus

Lesson Activities:	Strongly	Moderately	Weakly
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills;			
Are challenging and require higher order thinking and problem-solving skills;			
Allow for student choice;			

Provide scaffolding for acquiring targeted knowledge/skills;			
Integrate modern, global perspectives, especially those regarding diversity, genocide, global issues, and historical ones regarding racial relations;			
Integrate 21 st century skills;			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills;			
Are varied to address different student learning styles and preferences;			
Are differentiated based on student needs;			
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process;			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives;			
Provide opportunities for student reflection and self-assessment;			
Provide data to inform and adjust instruction to better meet the varying needs of learners.			

Appendix
Writing Instruction and the RFH Community

Writing instruction should happen across the RFH Community. Writing across the curriculum is a philosophy that advances the belief that writing is a method of learning. Since all departments are committed to helping students learn, writing must be used as a methodology to advance student learning.

Each academic discipline has its own unique conventions, formats and structures. It is the responsibility of each department to agree upon domain-specific writing praxes, model them for students, and require them to utilize them on a consistent basis. Students must understand that acceptable writing in one domain may not be acceptable writing in another area. The development of domain-specific writing skills supports the overall development of the student writer because all writing is grounded in the writing situation: audience, context, purpose, subject, and writer. Representatives from the academic disciplines must share their domain-specific writing praxes with each other, identify intersections, and determine how to address perceived gaps that limit student learning.

Students must experience writing situations that help them learn how to think creatively and critically and communicate effectively in the academic disciplines. Writing instruction, regardless of the academic discipline, must always reinforce student understanding of the writing situation. When students experience writing situations, they must study examples of domain-specific writing in order to understand how writers communicate in discipline-related contexts. This does not mean information embedded in textbooks. Domain-specific writing is writing that is used to inform and influence readers as it draws them into an established circle of discourse. Students must use these non-fiction texts to develop the close reading skills that will shape their own writing. Focused engagement with domain-specific writing should not be limited to basic reading comprehension and topical understanding. It must also include the analysis of the writing situation that is represented in the text: audience, context, purpose, subject, and writer. The close reading of well-written texts—regardless of the domain—will show students the importance of writing mechanics, diction, and syntax. The development of close reading skills will also help the students grow in terms of their ability to construct and advance independent and original claims that are well-supported by evidence. Domain-specific writing is grounded in positioning of claims and the effective use of evidence.

The final written product is important; nevertheless, the learning that results in this production must not be devalued. The writing process is not limited to the basic steps of planning, drafting, revising, and editing/proofreading. It is a complex sequence of critical and creative thinking and writing that leads to the production of a text that provides evidence of learning and understanding. Students must ultimately develop the ability to self-assess the effectiveness of their writing as a representation of the writing situation. Without the use of models that evidence learning and understanding, students will not develop the ability to self-assess their own work—the true outcome of the writing process.

What types of writing situations should RFH students engage in?

RFH students should engage in writing situations across the curriculum that require them to:

- write to improve mechanical proficiency, diction usage, and syntactical sophistication
- write to narrate, describe, and reflect
- write to summarize and report
- write to classify and define
- write to explain how process leads to an outcome
- write to compare, contrast and evaluate
- write to speculate on cause and effect
- write to propose solutions and solve problems
- write to analyze

These writing situations should be positioned in a coordinated, developmental sequence that extends across the academic disciplines.

Upon Completion of Grade 12, RFH students must be ready to transition to the following writing situations:

- write to analyze
- write to persuade (argument)

The core foci of first-year college writing courses are analysis and argument. These courses orient the students to the demands and expectations of writing for the academic culture of college. At colleges/universities with carefully coordinated writing programs, students must demonstrate proficiency in analysis and argument before they transition to upper level courses that require them to engage in the following writing situation:

- write to investigate (research)