Hampden Academy

Hampden Academy challenges all students to achieve individual excellence.

AP Calculus
B Day Period 3
Course Syllabus

"Mathematics is not a spectator sport." ~ Anonymous

Classroom Expectations:

1. Be respectful
2. Be honest and ethical
3. Be responsible
4. Be on time and be prepared
5. Have fun!

In addition you can expect the following of me in this class:

1. I will arrive on time and will be fully prepared to teach my class every day.
2. I will never be disrespectful to you in any way.
3. I will respect your right to privacy with regard to your grades, assignments, parent interactions, and other issues that concern you alone.
4. I will help you learn math even if that involves private tutoring. If you come to me for help I will work with you for as long as it takes!

Course Information

Course Title:	AP Calculus
Course Number:	466
Course Date:	2018-2019
Course Location:	Room 117
Instructor:	Sara Ballard **Office Hours:** I am typically available between 7:30 am and 8 am and afternoons between 2:05 pm and 3:30 pm or by appointment. Additionally, I am free the following periods during school: A Days Period 3 and B Days Period 1. **Phone:** (207) 862 - 3791 **E-mail:** sballard@rsu22.us
Course Description:	AP Calculus is a full-year college level course. Students should plan on a minimum of one hour of homework per class. A list of topics will include Functions, Limits, Differentiation, and Integration. This course is intended for students with a high ability level in mathematics and an inquisitive nature in high levels of mathematics thought. A **TI-84 Plus** graphing calculator will be used regularly. Students will be required to complete a summer assignment before class starts in the fall. Failure to due so will result in removal from course.
Prerequisite:	Honors Pre Calculus

Standards: Limits
Derivatives
Integrals

Learning Outcomes:

1. Be able to calculate average and instantaneous speeds.
2. Be able to define and calculate limits for function values and apply the properties of limits.
3. Be able to use the Sandwich Theorem to find certain limits indirectly.
4. Be able to find and verify end behavior models for various functions.
5. Be able to calculate limits as $x \to \pm\infty$ and to identify vertical and horizontal asymptotes.
6. Be able to identify the intervals upon which a given function is continuous and understand the meaning of continuous functions.
7. Be able to remove removable discontinuities by extending or modifying a function.
8. Be able to apply the Intermediate Value Theorem and the properties of algebraic combinations and composites of continuous functions.
9. Be able to apply directly the definition of the slope of a curve in order to calculate slopes.
10. Be able to find the equations of the tangent line and normal line to a curve at a given point.
11. Be able to find the average rate of change of functions.
12. Be able to calculate slopes and derivatives using the definition of the derivative.
13. Be able to graph f from the graph of f', graph f' from the graph of f, and graph the derivative of a function given numerically with data.
14. Be able to find where a function is not differentiable and distinguish between corners, cusps, discontinuities, and vertical tangents.
15. Be able to approximate derivatives numerically and graphically.
16. Be able to use the rules of differentiation to calculate derivatives, including second and higher order derivatives.
17. Be able to use the derivative to calculate the instantaneous rate of change.
18. Be able to use derivatives to analyze straight line motion and solve other problems involving rates of change.
19. Be able to use the rules for differentiating the six basic trigonometric functions.
20. Be able to differentiate composite functions using the Chain Rule.
21. Be able to find slopes of parameterized curves.
22. Be able to find derivatives using implicit differentiation.
23. Be able to find derivatives using the Power Rule for Rational Powers of x.
24. Be able to calculate derivatives of functions involving the inverse trigonometric functions.
25. Be able to calculate derivatives of exponential and logarithmic functions.
26. Be able to determine the local or global extreme values of a function.
27. Be able to apply the Mean Value Theorem and find the intervals on which a function is increasing and decreasing.
28. Be able to use the First and Second Derivative Tests to determine the local extreme values of a function.
29. Be able to determine the concavity of a function and locate the points of inflection by analyzing the second derivative.
30. Be able to graph f using information about f'.
31. Be able to solve application problems involving finding minimum or maximum values of functions.
32. Be able to find linearizations and use Newton's method to approximate the zeros of a function.
33. Be able to estimate the change in a function using differentials.
34. Be able to solve related rate problems.
35. Be able to approximate the area under the graph of a nonnegative continuous function by using rectangle approximation methods.
36. Be able to interpret the area under a graph as a net accumulation of a rate of change.

37. Be able to express the area under a curve as a definite integral and as a limit of Riemann sums.
38. Be able to compute the area under a curve using a numerical integration procedure.
39. Be able to apply rules for definite integrals and find the average value of a function over a closed interval.
40. Be able to apply the Fundamental Theorem of Calculus.
41. Be able to understand the relationship between the derivative and definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
42. Be able to approximate the definite integral by using the Trapezoidal Rule and by using Simpson's Rule, and estimate the error in using the Trapezoidal and Simpson's Rules.
43. Be able to construct antiderivatives using the Fundamental Theorem of Calculus.
44. Be able to solve initial value problems in the form $\frac{dy}{dx} = f(x)$, $y_0 = f(x_0)$.
45. Be able to construct slope fields using technology and interpret slope fields as visualizations of different equations.
46. Be able to use Euler's Method for graphing a solution to an initial value problem.
47. Be able to compute indefinite and definite integrals by the method of substitution.
48. Be able to solve problems involving exponential growth and decay in a variety of applications.
49. Be able to use integration to calculate areas of regions in a plane.
50. Be able to use integration (by slices or shells) to calculate volumes of solids.
51. Be able to use integration to calculate surface areas of solids of a revolution.
52. Be able to use integration by parts to evaluate indefinite and definite integrals.
53. Be able to use tabular integration or the method of solving for the unknown integral in order to evaluate integrals that require repeated use of integration by parts.
54. Be able to use integration by parts to integrate inverse trigonometric and logarithmic functions.
55. Be able to solve problems involving exponential or logistic population growth.
56. Be able to find limits of indeterminate forms using l'Hôpital's Rule.
57. Be able to use limits to evaluate improper integrals.
58. Be able to use the direct comparison test and the limit comparison test to determine the convergence or divergence of improper integrals.

Instructional Methods:

This course is taught using a variety of instructional methods including, but not limited to, direct instruction, class discussions, worked examples, individual work, and collaborative learning.

Supporting Materials:

Textbook Title: Calculus: Graphical, Numerical, Algebraic: 3rd Edition
Publisher: Pearson Prentice Hall

Materials: Ti-84 Graphing Calculator is required
3 Ring Binder
Pencil and Pen

Google Classroom Code: p8eliig

Topics:

Section	Topics	Timeline
2.1	Rates of Change and Limits	3 to 4 weeks on Chapter 2: Limits and Continuity
2.2	Limits Involving Infinity	

2.3	Continuity	
2.4	Rates of Change and Tangent Lines	
3.1	Derivative of a Function	4 to 5 weeks on Chapter 3: Differentiation
3.2	Differentiability	
3.3	Rules for Differentiation	
3.4	Velocity and Other Rates of Change	
3.5	Derivative of Trigonometric Functions	
3.6	Chain Rule	
3.7	Implicit Differentiation	
3.8	Derivatives of Inverse Trigonometric Functions	
3.9	Derivatives of Exponential and Logarithmic functions	
4.1	Extreme Values of Functions	3 to 4 weeks on Chapter 4: Derivatives
4.2	Mean Value Theorem	
4.3	Connecting f' and f'' with the graph of f	
4.4	Modeling and Optimization	
4.5	Linearization	
4.6	Related Rates	
5.1	Estimating with Finite Sums	3 to 4 weeks on Chapter 5: The Definite Integral
5.2	Definite Integrals	
5.3	Definite Integrals and Antiderivatives	
5.4	Fundamental Theorem of Calculus	
5.5	Trapezoidal Rule	
6.1	Slope Fields	3 to 4 weeks on Chapter 6: Differential Equations and Mathematical Modeling
6.2	Antiderivatives by Substitution	
6.4	Exponential Growth and Decay	
7.2	Areas in the Plane	2 to 3 weeks on Chapter 7: Applications of Definite Integrals
7.3	Volume	
8.2	L'Hôpitals Rule	1 week on Chapter 8: Sequences, L'Hôpitals

		Rule, and Improper Integrals

After the AP Exam:

Section	Topics	Timeline
6.3	Antidifferentiation by Parts	1 to 2 weeks after the AP Exam Material
6.5	Antidifferentiation by Partial Fractions	
8.4	Improper Integrals	

Assessment:

Formative assessment tools: Quizzes and Math Practice

Summative assessment tools: Tests, Final Exam, and AP Exam

Grading Policy: Your grade in this class will be calculated as follows:

60% Tests: This category will include chapter tests, the final exam, and the AP Exam.

Chapter Tests:
Rigorous exams be given for each chapter. Tests will contain multiple choice and free response questions and will include problems similar to the quizzes, homework, and questions you will encounter on the AP Exam. There will be a non-calculator and a calculator portion of each test. Tests are all designed to be completed in an 80 minute class period. If you are absent on the day of a test, the test should be completed either before the next class period or during the next period. Regardless of absences, all students will take the test on the designated test day unless prior arrangements have been made.

Final Exam:
In the beginning of the 4th quarter, typically the week following April Vacation, you will take a final exam. The final exam will be similar to the AP Exam in early May and will count as 2 test grades.

AP Exam:
If you complete the entire AP exam for the 3+ hours, then you will earn a 100 as one test grade in quarter 4.

30% Quizzes: Quizzes will typically be given after two or three sections have been covered in a chapter. On overage, two quizzes will be given per chapter. Quizzes are closed notes unless otherwise specified. Quizzes will be designed to be completed in 40 minutes.

Quiz Corrections:
You will have an opportunity to complete quiz corrections on all of your quizzes and can earn back half of your points on your quizzes for making these corrections. In order to earn back half of your points on your quizzes, you must have the correct answers for all of the problems on your quiz, have all of the correct work to support your new answers, and fill out the quiz correction form. Quiz corrections must be turned in on or before the chapter

test. If you are having trouble completing your quiz corrections, feel free to set up a time to see me for help.

10% Math Practice: Math practice will consist of both homework and in-class work. Homework will be assigned on a **daily** basis. Homework assignments will reinforce the material learned in the last day's class period and will also be used to develop the skills necessary to be successful for the next class. Problems will be either from the text or will be on a handout and are due the next class period. These problems will be due at the start of the next class period and will be graded using the following scale:

10 pts: all problems completed; acceptable presentation
(neat, organized with process clearly demonstrated)
9 pts: 1 or 2 problems not completed with satisfactory presentation;
OR presentation is slightly unsatisfactory (a little disorganized);
OR only part of the mathematical process is clearly shown
8 pts: majority of problems completed with satisfactory presentation;
OR unsatisfactory presentation (difficult to follow work or find answers);
OR the mathematical process is only shown
7 pts: minority of problems completed;
OR very little work is shown;
OR very disorganized
0 pts: unexcused absence;
OR assignment not completed

AP Exam

Date: Tuesday, May 14, 2019 8:00 a.m.
Cost: $94

Exam Format:

Section 1:

Multiple Choice - 45 Questions (1 hour and 45 Minutes and counts as 50% of Exam Score)

- **Part A:** 30 questions; 60 minutes (calculator not permitted)
- **Part B:** 15 questions; 45 minutes (graphing calculator required)

Section 2:

Free Response - 6 Questions (1 hour and 30 Minutes and counts as 50% of Exam Score)

- **Part A:** 2 questions; 30 minutes (graphing calculator required)
- **Part B:** 4 questions; 60 minutes (calculator not permitted)

Final Note: Each day you need to come to class prepared, willing to try your hardest, and with a positive attitude. In addition, I strongly encourage contacting me either at school or via e-mail in order to get help if you need it. Good luck this year and let's have some fun in math!

If you have any questions about the syllabus or about AP Calculus, please feel free to contact me.