

KAP CALCULUS SYLLABUS
Horizon Science Academy Columbus High School
Columbus, OHIO – Aug 2012

The purpose of this course is to introduce you to **differential calculus**. You will learn *what* a derivative is, *how* to take derivatives of functions, and *when* to take derivatives. You will also learn similar things about integrals. Throughout the course, we will focus on learning good problem-solving habits and techniques.

In our study of calculus, we will explore the following topics:

Course Material: The following is an ordered section list. Some sections may be omitted or abbreviated to accommodate our tight time schedule, and some sections may not require written homework.

- 1.1 Review of Functions
- 1.2 Representing Functions
- 1.3 Inverse, Exponential, and Logarithmic Functions
- 1.4 Trigonometric Functions and Their Inverses
- 2.1 The Idea of Limits
- 2.2 Definitions of Limits
- 2.3 Techniques for Computing Limits
- 2.4 Infinite Limits
- 2.5 Limits at Infinity
- 2.6 Continuity
- 3.1 Introducing the Derivative
- 3.5 Derivatives as Rates of Change (selections from)
- 3.2 Rules of Differentiation
- 3.3 The Product and Quotient Rules
- 3.4 Derivatives of Trigonometric Functions
- 3.6 The Chain Rule
- 3.8 Derivatives of Logarithmic and Exponential Functions
- 3.9 Derivatives of Inverse Trigonometric Functions
- 3.7 Implicit Differentiation (selections from)
- 3.10 Related Rates
- 4.1 Maxima and Minima
- 4.2 What Derivatives Tell Us
- 4.3 Graphing Functions
- 4.4 Optimization Problems
- 4.5 Linear Approximation and Differentials
- 4.6 Mean Value Theorem
- 4.7 L'Hopital's Rule
- 4.8 Antiderivatives
- 5.1 Approximating Areas Under Curves

5.2 Definite Integrals
5.3 Fundamental Theorem of Calculus
5.4 Working with Integrals
5.5 Substitution Rule
6.1 Velocity and Net Change
6.2 Regions Between Curves
Differential Equations

GENERAL INFORMATION AND COURSE POLICIES

Calculus: Early Transcendentals
William L. Briggs, *University of Colorado at Denver*
Lyle Cochran, *Whitworth University*

Software: There will be a considerable amount of work done with the aid of the computer algebra system, *MAPLE*. The MAPLE program is available for our use in the computer lab. I will assume no prior knowledge of MAPLE, so you will learn what you need to know as we go.

Homework: As with any math class, *homework is the most important aspect of the course*. Homework exercises will be collected and graded regularly. The homework may involve computer exercises as well as hand-written computations and explanations. Your homework must be legible, with problem number and final answer clearly indicated. Explanations should be written in complete sentences. Avoid the use of the word “it”. Random math expressions floating in space will receive no credit!

1. Homework is due at the **END** of class on the assigned due date, unless I specify otherwise. Late homework will not be accepted without an excuse or prior arrangement.
2. Your homework will be evaluated on **neatness, completeness, and correctness**.
3. Group work is encouraged, but assignments must be written up **INDIVIDUALLY** unless you are told otherwise. **Copied work will receive no credit**—even if the work was discussed in collaboration with a classmate before write-up.

Daily Reading: **Reading the textbook before each lesson is a necessity**. Come to class prepared with questions and comments for discussion. There will not be enough time to cover all aspects of each topic during class. You will still be held responsible for the material.

Maple Labs and Writing Projects (15% of your total grade): There will be numerous labs and projects throughout the year. These will involve a significant writing

component. Be sure to **write in complete sentences**, and include all accompanying mathematics and computer computation in a **clear, concise, and convincing manner**. **Your grade will be based on both presentation and mathematical correctness**. Good problem-solving and writing skills are essential to almost all successful mathematical pursuits.

Quizzes (Exam Rehearsals): Students benefit from extra practice on solving problems in an exam setting. In-class quizzes are intended to provide such practice and give students feedback on how well they know the most important core topics of this course. If a student has a weakness in a particular area, better to find out on a quiz rather than an exam. There will be a quiz in every two weeks. The in-class quizzes will usually be about 10 to 15 minutes long and will consist of one or two exam-like problems on core course topics.

Exams: There will be 3-4 exams in each semester. Students will be given a chance to make test corrections.

Final: Final exams will be at the end of each semester and will be comprehensive.

Grades: Your grade will be based on the daily homework, Maple labs and other projects, exams, quizzes, the Gateway Exam, midterm and comprehensive final exam. Each will be weighted as follows:

	% of Total
Homework	15
MathLabs	9
Writing Project	6
Exams	25
Quiz	15
The Gateway Exam	10
The Final Exam	20

The Grading Scale:

A+	97% and above
A	94% - 96%
A-	90% - 93%

B+	87% - 89%
B	84% - 86%
B-	80% - 83%
C+	77% - 79%
C	74% - 76%
C-	70% - 73%
D+	67% - 69%
D	64% - 66%
D-	60% - 63%
F	0% - 59%

The Gateway Exam: The Gateway Exam will consist of seven problems that will test a student's ability to apply differentiation and integration rules correctly without the aid of technology. To pass the Gateway Exam, a student must present *flawless* solutions to all seven problems. By "flawless", we mean that a solution must be 100% correct in terms of computation AND presentation. A misplaced equal sign or an omitted parenthesis would make a problem incorrect. The Gateway Exam is worth 10% of the final grade.

Since PERFECT solutions are required, a reasonable number of retakes of the Gateway Exam are permitted according to the following guidelines.

1. Retakes will be of a similar format to the first Gateway Exam, but will consist of different problems.
2. A student who passes the Gateway Exam on his/her first attempt will receive 120 points out of 100 (or an extra 2% for the total course grade) for this portion of the course..
3. A student who passes a retake within two weeks after the Gateway Exam is first given will receive 100 points (i.e. full credit) for this portion of the course.
4. A student who passes a retake after more than two weeks have passed since the first Gateway Exam will receive 50 points out of 100 (i.e. half credit) for this portion of the course.
5. A student who fails to pass the Gateway Exam on all attempts will receive 0 points out of 100 (i.e. no credit) for this portion of the course.