KAP CALCULUS SYLLABUS
EDISON HIGH SCHOOL
MILAN, OHIO

The purpose of this course is to introduce you to differential calculus, the study of elementary functions and their variations and rates of change, and a brief introduction to integral calculus. You will learn *what* a derivative is, *how* to take derivatives of functions, and *when* to take derivatives. You will also 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:

0. Review of Pre-calculus Concepts

a. Machine Graphics
b. Real Numbers and the Coordinate Plane
c. Lines and Linear Functions
d. Polynomials and Rational Functions
e. Algebra of Exponentials and Logarithms
f. Trigonometric Functions
g. Real-World Calculus: From Words to Mathematics

I. Introduction to MAPLE

(MAPLE is a computer algebra system which will be used to help illustrate the concepts we develop in calculus. Numerous MAPLE labs are used throughout the course.)

a. Introduction to MAPLE Lab
b. Constructing New Functions from Old Functions: MAPLE Lab

II. Functions and Derivatives: The Graphical View

a. Functions, Calculus Style
b. Graphs of Elementary Functions
c. Taxonomy of Functions: MAPLE Lab
d. Amount Functions and Rate Functions:
   Introduction to the Idea of the Derivative
e. Estimating Derivatives
f. The Geometry of Derivatives
g. The Geometry of Higher Order Derivatives:
   Stationary Points, Extrema, Concavity, Inflection Points,
   The First Derivative Test, The Second Derivative Test,
   Graphing Functions using Derivatives

III. Functions and Derivatives: The Symbolic View

a. Definition of the Derivative
b. Derivatives of Power Functions and Polynomials
c. Limits
d. Limits: MAPLE Lab
e. Using Derivative and Anti-derivative Formulas
f. Derivatives of Exponential and Logarithmic Functions
g. Derivatives of the Trigonometric Functions
h. Derivatives of the Inverse Trigonometric Functions

IV. Finding Derivatives Using Rules

a. The Product Rule and the Quotient Rule
b. The Chain Rule
c. Graphing Implicitly Defined relations: MAPLE Lab
d. Implicit Differentiation
e. Miscellaneous Derivatives and Anti-derivatives

V. Using the Derivative

a. Limits Involving Infinity and L'Hopital's Rule
b. Optimization Problems
c. Related Rates
d. Newton's Method: Finding Roots
e. Taylor Polynomials
f. Why Continuity Matters: Intermediate Value Theorem
Extreme Value Theorem
g. Why Differentiability Matters: The Mean Value Theorem

VI. The Integral

a. Areas and Integrals
b. The Area Function
c. The Fundamental Theorem of Calculus
d. Finding Anti-derivatives: The Method of Substitution

GENERAL INFORMATION AND COURSE POLICIES

The Text: Arnold Ostebee and Paul Zorn, ***Calculus from Graphical, Numerical, and Symbolic Points of View***, Second Edition, Houghton Mifflin Company, 2002.

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. We will also use the TI-84 calculator on a daily basis.

Daily Homework (15% of your total grade): 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!

HOMEWORK POLICY

1. Homework is due at the START of class on the assigned due date, unless I specify otherwise. Late homework will not be accepted. If you know you will be missing class for some reason (e.g., an athletic event), turn in your assignment BEFORE you leave. Under extenuating circumstances extensions may be granted, but this should be discussed with me in advance.

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 other 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.

EXAMS (70% of your total grade): There will be eight regular exams (each worth 5% of your total grade), the Gateway exam (worth 10% of your total grade), and a comprehensive final exam (worth 20% of your total grade). There are **NO RETAKES** on the eight regular exams and the final exam!!! Retakes are allowed on the Gateway Exam. These exams will be given in this order:

Appendix Exam		(5%)
Exam 1.1	(Sections 1.1 – 1.3)	(5%)
Exam 1.2	(Sections 1.4 – 1.7)	(5%)
Exam 2.1	(Sections 2.1, 2.2, 2.3, 4.2)	(5%)
Exam 2.2	(Sections 2.4, 2.6, 2.7)	(5%)
Exam 3.1	(Sections 3.1 – 3.3)	(5%)
Exam 3.2	(Sections 3.3 – 3.4)	(5%)
The Gateway Exam		(10%)
Exam 4.1	(Sections 3.5, 4.2, 4.3)	(5%)
Final Exam	(All previous sections and sections 4.5, 4.6, 4.8, 4.9, 5.1, 5.2, 5.3, 5.4)	(20%)

Grades: Your grade will be based on the daily homework, Maple labs and other projects, 8 exams, the Gateway Exam, and the comprehensive final exam. Each will be weighted as follows:

	% of Total
Daily Homework	**15**
Labs and projects	**15**
8 Exams (5% each)	**40**
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 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.