Course outline: **Calculus** (Semester)

Text: Calculus of a Single Variable, 7th Ed. – Larson, Hostetler, Edwards 2002

Outline with approximate timeline for completion and topics covered.

Semester course will cover chapters P through 4 inclusive and parts of Chapter 5, 6 and 7.2

Chapter P: Preparation for Calculus **Graphs and Models** (approximately 5-6 days)

Multiple representations of functions, verbal, numerical, visual, and algebraic. A discussion of mathematical models leads to a review of the standard functions from these four points of view.

Four ways to represent functions
Mathematical Models
New functions from old functions (translations, amplitude, etc.)
Graphing using calculators and computers (TI calc., Mathematica ?)
P1: Graphs and Models
P2: Linear Models and Rates of Change
P3: Functions and Their Graphs
P4: Fitting Models to Data

Chapter 1: **Limits and Their Properties -Limits and Rates of Change** (approximately 9-12 days)

The concept of a limit is motivated by a prior discussion of the tangent and velocity problems. Limits are treated from descriptive, graphical, numerical, and algebraic points of view. The formal epsilon-delta definition is explored in section 1.2.

1.1 A Preview of Calculus
1.2 Finding Limits Graphically and Numerically
1.3 Evaluating Limits Analytically (Algebraically)
1.4 Continuity and One-Sided Limits
1.5 Infinite Limits

Chapter 2: **Differentiation - Derivatives** (approximately 15-19 days)

This chapter uses the limit process to develop the concept of a derivative as a function through the use of the classic tangent line problem. We explore the meaning of derivatives in various contexts, including slopes of tangent lines to curves, instantaneous rates of change (compared to average rates of change) and in application problems involving velocity, acceleration and Related Rates of change. Derivatives of Algebraic as well as transcendental (trigonometric) are covered.

2.1 The Derivative and The Tangent Line Problem
2.2 Basic Differentiation Rules and Rates of Change
2.3 The Product and Quotient Rules and Higher-Order Derivative
2.4 The Chain Rule for derivatives of composite functions.
2.5 Implicit Differentiation
2.6 Related Rates

Chapter 3: **Applications of Differentiation** (approximately 13-17 days)

The concepts of monotonic functions and concavity are used to explain how the derivative affects the shape of a graph. Graphing with technology emphasizes the interaction between calculus and calculators allowing for the analysis of families of curves, including utilizing derivatives to determine behaviors of functions such as increasing/decreasing, concave up/concave down, as well as locating extrema and inflection points along with the concepts of continuity and differentiability. Limits at infinity are discussed in their relation to locating asymptotes of a the graph of a function and horizontal, vertical and slant asymptotes are discussed. Rolle's Theorem and the Mean Value Theorem for Integrals are also discussed extensively and finally a substantial set of optimization problems are provided and addressed.

3.1 Extrema on an interval
3.2 Rolle's Theorem and The Mean Value Theorem for Derivatives
3.3 Increasing and Decreasing Functions and the First Derivative Test
3.4 Concavity and the Second Derivative Test
3.5 Limits at Infinity
3.6 A Summary of Curve Sketching
3.7 Optimization Problems

The following sections are optional time permitting and left to the discretion of the instructor:

3.8 Newton's Method for approximating zeros of functions (if time permits)
3.9 (if time permits)

Chapter 4: **Integration -Integrals** (approximately 11-14 days)

Area are used to motivate the concept of a definite integral, with sigma notation introduced as needed. The definition of integrals is achieved through the use of subintervals of equal width for simplification and emphasis is placed on explaining the meanings of integrals in various contexts and on estimating their values using various method including the approximation of areas using rectangles with left-side/right-side and midpoint estimates as well as numerical approximations of area through the trapezoidal method and Simpson's method using 2^{nd} degree polynomials. Fundamental Theorem of Calculus is introduced and utilized for finding exact areas, average values of functions and an application of the Mean Value Theorem for Integrals.

4.1 Antiderivatives and Indefinite Integrals
4.2 Area
4.3 Riemann Sums and Definite Integrals
4.4 The Fundamental Theorem of Calculus
Average Value of a Function and The Mean Value Theorem for Integrals
4.5 Integration by Substitution
4.6 Numerical Integration (Trapezoidal Rule and Simpson's Rule)

Chapter 5: **Logarithms and Exponentials** (approximately 1-3 days)

5.1-5.3 Natural Logarithmic Functions, Integrals involving logarithmic and Exponential functions (integration of exponential functions and logarithmic functions):
$f(x) = e^x$ and $f(x) = \ln(x)$

Chapter 6: **Applications of Integration** (approximately 10-13 days)

Applications of integration involving: area, volume, and average value, that can reasonably be done without specialized techniques of integration are explored General methods are emphasized and the goal is for students to be able to utilize the disk, washer and/or shell methods for finding volume of solids of revolution.

6.1 Areas of a Region Between Two Curves
6.2 Volumes (disk and washer methods)
6.3 Volumes by Cylindrical Shells (shell method)

Chapter 7: **Integration Techniques** (1-2 days)

7.2 Integration by Parts

END OF SEMESTER (HALF YEAR COMPLETE)

Calculus – Mr. Holzkamm

Calculus is a college level course, not a college prep. course. As such, the level of the material in this course will exceed what you are familiar with from your other courses and will require a much larger commitment of time and effort on your part to master. I suggest you form study groups or find a study partner to work with for this course.

Each of you will be assigned a book by number. Please put your name and year inside the front cover of the book in ink. It is your responsibility to bring that book and materials (paper, pencils, and calculator) to class every day.

Materials Needed for Class
A 3-ring binder (recommended) or a large notebook and folder, paper (lined), graphing calculator (TI 83 or equivalent recommended), and pencils (all assignments, quizzes, and tests must be done in pencil).

Notebook
You will be required to keep in your notebook (or binder): terms, theorems, properties, etc., returned quizzes and assignments, along with examples worked out in class.

Daily Assignments
Daily assignments will be kept in your binder (or notebook) until they are collected for grading or graded in the notebook. The first section of you notebook should be devoted to notes and the latter part will be the assignments in the order they were assigned with page, problems and date written in the upper right of each page. ***When a student has been absent they are responsible for getting the assignment they missed and if necessary scheduling a time to make up any quizzes or tests within two days after returning to class. All makeup work must be turned in within the guidelines set up by the school to receive credit. That is one day for each day absent plus one additional day. (example: 2 days absent – student receives 3 days to make up the work for credit)***

In-class Work-time
I will try to provide time in class for you to start your assignment (if time permits) but you must complete the assignment before the next class period unless otherwise instructed. ***Any graded assignment not completed satisfactorily on time will be given a grade of zero, however they may be turned in late for a penalty of 10 % per class day they are late up to ten days after which they are not worth any points***.

For Questions and Help on Homework
I will be available in the Math Office during period 4 (second and third lunches) and from 2:31-3:00 each day in room 201 J. Also, there is at least one math teacher available each period of the day and I can help you identify the teacher available during your free periods.

Grading
Grading Scale: 89.5-100 % A, 79.5-89.4 B, 69.5-79.4 C, 59.5-69.4 D, below 59.5 F

Quarter Grades are based on: 30 % from Daily Grades (quizzes-unannounced, worksheets, homework)
70 % from Tests (given at the end of chapters or approx. every 2 weeks)

Your goal should be to do your absolute best on everything you do at all times. Remember, ultimately you are responsible for your learning . . .ALWAYS DO YOUR BEST.

Calculus – (Semester): Mr. Holzkamm

Chapter –P

Section:	Assignment:
P1	pg. 8-9 (1-4 all, 5-31 odd, 37,39,41,43,49,53,63-71 odd, 75)
P2	pg. 16-17 (1,3,5,9,20,23,25,27,28,30,31,35,37,43, 45-55 odd, 59,61,63)
P3	pg. 27 (1-35 odd, 47,53,55, 59,61)
P4	pg. 33 (1-5 all, 7)
Rev	pg. 36-37 (1-17 odd, 21,25-41 odd, 45, 47, 48)

Chapter –1

Section:	Assignment:
1.2	pg. 54-56 (1,2,3,5,6, 9-18 all, 23,24,25,27,29)
1.3	pg. 65-66 (1,4, 5-27 odd, 37, 39, 41-45 all, 47, 49-57 odd, 67,69,71)
1.4	pg. 76-78 (1-6 all, 7-17 odd, 12, 21, 25-28 all, 29-47 odd, 57,59,61, 69-72 all, 75,76,79,80,83,85)
1.5	pg. 85 (1-7 all, 9,11,19,29,31,33,35,37,41,49,51)
Ch 1 Rev.	pg. 88-89 (1-7 all, 9,11, 13-17 all, 19,21,25,26,29,30,31,33,35,37,38, 43,47,48,53,54,57,59,63)

Chapter –2

Section:	Assignment:
2.1	pg. 101-104 (1a,b, 2a,b, 3a,b, 4a,b, 5,7,9,11,13,15,17,19,21, 25,27,29,33,35,39,40,41,42,47,61,63,66, 71,72,73,74,75,76,77,78,79,80,85,86)
2.2	pg. 113-116 (1a, 2a, 3-23 odd, 8,10, 25-30 all, 31,33,35,36,39,41, 43,45,47,49,51,53,55,57,59,61,63, 65,87,88,89,91,92,93,94,101,102)
2.3	pg. 124-126 (1-35 odd, 18,24,26,39,41,42,43,44,45,46,48,49 51,52,53,54,63,65,67,69,70,75,76,83, 85,86,87,89,90,91,101)
2.4	pg. 133-134 (1,3,4,5,6, 7-33 odd, 47,49,51,53,55,57,59,65,67,69,75,77,79,81)
2.5	pg. 142 (1-17 odd, 21,23,25,29,31,35,37,39,43,47)
2.6	pg. 149-151 (1,3,4,5,6,13,15,18,19,20,21,22,23,24,26,27,31,33,35)
Rev.	pg. 153-155 (1,3,5,6,7,9,11,13,17,19,21,23,25,27,29,31,41,43,45,47, 49,51,53,55,57,59,61,63,65,67, 69,71,73,75,77,79,99,101,103, 105,107,108)

Chapter –3

Section:	Assignment:
3.1	pg. 165-166 (1-14 all, 17,18,19,20,24,25,27)
3.2	pg. 172 (1,2,3,5,7,9,10,11,13,14,22,29,30,31,33,35)
3.3	pg. 181-182 (1-6 all, 11,13,15,19,21,23,27,29,31,41,61,62)
3.4	pg. 189-191 (1-8 all, 11,13,15,17,19,27,29,31,35,37,53,54,55,56,67,68)
3.5	pg. 199-200 (1-6 all, 15,16,17,18,19,21,22,23,25,26,27,49,51,53,61,63)
3.6	pg. 208 (1-7 all, 10,11,12,17,23,29,33,37,38)
3.7	pg. 216-218 (1,3,4,5,6,7,9,13,15,16,17,18,20,22,23,29)
3.8	pg. 226 (1,3,5,7,9,15)
3.9	pg. 233 (1,3,5,7,9,11,13)
Rev Ch 3	pgs. 235-237 (1,3,4,5-12 all, 15-17 all, 19,23-28 all,33-40 all,45,47,53,55,57,59)

Chapter –4

Section:	Assignment:
4.1	pg. 249 (1-41 odd)
4.2	pg. 261-263 (1,3,5,7,15,17,21, 23-30 all, 47, 49, 53)
4.3	pg. 272-273 (13-22 all, 23,25,27,29,31)
4.4	pg. 284 (5-29 odd, 35,37,39), pg. 284-285 (41-44 all, 45,46,49,50)
4.5	pg. 297 (1-33 odd, 41-53 odd), pg. 298 (65,67,69,71,73,75,77,79,81)
4.6	pg. 305 (1,3,5,7,9,11,13)
Rev Ch 4	TBA

Chapter –5

5.1-5.3	pg. 322 (45-53 odd), pg. 330 (1-9 odd), pg. 348 (39-47 odd), pg. 349 (87-93 odd)

Chapter –6/7 (6.1-6.3 and 7.2)

Section:	Assignment:
6.1	pg. 418 (1,3,5,7,9,15,17,19)
6.2	pg. 428 (1,2,3,4,7,8,9,10) "Disk Method"
	pg. 428 (5,6,11,13,15,21) "Washer Method"
6.3	pg. 437 (1,3,5,7,13,15,17,19,21) "Shell Method"
7.2	pg. 437 (1,2,3,4,13,14,17)
Rev Ch 6/7	TBA