# AP Calculus AB

Instructor: Mrs. Bernice Philpot– B.S.E, M.S.E; Henderson State University EdS, U.A. Fayetteville

Telephone: (479) 394-1144;

E-Mail: Bernice.philpot@menaschools.org

Conference: 9:30-10:20 Room 107

Resources Text: Finney, Demana, Waits, and Kennedy. *Calculus—Graphical, Numerical, Algebraic.* 3rd ed. Pearson Prentice Hall, 2007.

Tutoring before and after school as posted.

Prerequisites**:** Grades of C or better in precalculus recommended. *Concurrent option***:** Grades of C or better in MTH203 (College Algebra) and MTH213( Plane Trigonometry).

**Face Mask Policy:** As per the Executive Order from the governor of Arkansas, all students are required to wear a proper face covering that completely covers the nose and mouth while on campus and in class. Masks with holes or masks that do not completely cover nose and mouth are not acceptable. Any student that does not have a proper mask will leave class and be referred to the Vice Chancellor for Student Affairs for possible disciplinary action.

**Food and Drink:** Food and drinks, including water are not allowed in the classroom at any time.

**Course Description**: This is an extremely rigorous course and is designed primarily to serve students majoring in mathematics, engineering, physics, chemistry, and various other fields of science. Course content includes a study of functions, limits and continuity, differentiation of algebraic functions and their applications, indefinite integrals, and definite integrals and their applications. **Students scoring a C or higher for both semesters will be awarded 5 college credit hours in Calculus 1 MTH245 *NCAA Core Course***

**Course Objectives:** Upon successful completion of Calculus and Analytic Geometry, the student should be able to:

1. Demonstrate understanding of functions and their graphs, limits, continuity, derivatives, indefinite and definite integrals and their applications.
2. Work with functions represented in a variety of ways—graphically, numerically, analytically, and verbally—and understand the connections among these representations.
3. Use critical thinking to formulate decisions and problem solving based on reasoning and analysis.

4. Communicate mathematics and explain solutions to problems both verbally and in written sentences.
5. Use graphing calculators to help solve problems, experiment, interpret results, and support conclusions.

**Expected Student Learning Outcomes:**
The student will understand and be able to apply the concepts involved with limits, derivatives, and integrals. Topics required are:

- Functions, including sketching, slopes, minimum, maximum, relative extrema, inflection points, asymptotes, and other analysis
- Limits
- Continuity
- Differentiation
- Implicit differentiation
- Exponential, trigonometric, and logarithmic functions
- Exponential growth and decay
- Course includes application of above topics, such as:
    - Slope and rates of change
    - Maximum and minimum values and optimum solutions to problems
- Antiderivatives
- Definite and indefinite integration, including the Fundamental Theorem of Calculus
- Area between curves
- The student will understand and apply the following integration techniques (Calculus I or Calculus II):
- Integration by parts
- Trigonometric and substitutions
- Integration of rational functions using partial functions

Methods of Instruction: This course will be taught through College Board lecture videos, question and answer, and tutorial methods.

Assessments**:** Students are assessed through College Board worksheets, quizzes, and exams. Calculators are allowed on exams; however some exams have both calculator active and non-calculator active portions. Exams include multiple choice and open response items.

**Course Requirements / Evaluation (Grading):**

1. **Tests and Quizzes** are 50% of your quarter grade. Four chapter tests are scheduled for each quarter. Quizzes may or may not be announced.
2. **Homework** are 50% of your quarter grade.

Final grades will be assigned according to the following percentage scale:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 90-100 | A | 80-89 | B | 70-79 | C | 60-69 | D | 0-59 | F |

Required Supplemental Materials: Students will need their MHS Chromebook. Students will need paper along with pencils and a graphing calculator (preferably TI-84+ or better) one of their own or a rental one from MHS.

## Homework Policy

Purpose: The homework policy described below is based on the assumptions that **homework assignments are primarily a *learning* tool, not a grading tool,** and that the purpose of homework is threefold:

I. **Homework is to give students practice in explaining the concepts and using the techniques learned in the course;**
II. **Homework is to allow the teacher to see how the students are doing and to try to correct errors they are making BEFORE quizzes and exams;**
III. **Homework is to give students a chance to see the errors they are making and to correct them BEFORE the quizzes and exams.**

### HOW TO TURN IN

I. Homework should be handwritten neat, legible and written in pencil; **always show your work** on a standard sheet of paper. Take a picture and upload to the **google classroom** assignment.
II. Assigned homework will be given a due date and time, this will be strictly adhered to.
III. Physical worksheets and tests should be kept in a 3 ring binder.

## HOMEWORK CORRECTIONS

**Homework corrections will only be graded if all the following are true.**

I. Redo only the missed problems that were attempted on separate sheet of paper.
II. Reflect and tell exactly what was mathematically wrong originally.
III. Take a picture and upload to google classroom. Staple the corrections to the front of the original assignment and place in your 3 ring binder.
IV. Corrections are only graded for **on time assignments.**
V. All corrections are due the class period of the chapter test.

## Late Homework

I. Late homework may not be graded as promptly as homework turned in on time, but will

be graded.

II. Late homework corrections **will not** be graded.

## Make-up exam/quiz policy

Exams: **Make-up exams are given; however, it will not be the same exam given during the class.** Students who have to miss an exam for any reason will be given a new date and time for the make up exam. Make-up exams will be parallel to the original exams, not more difficult.

Academic Dishonesty: Any suspicion of academic dishonesty will result in no credit for the assignment in

**Course Outline:**

Unit 2: Limits and Continuity

- A. Rates of change
- B. Limits at a point
  - 1. Properties of limits
  - 2. Two-sided
  - 3. One-sided
- C. Limits involving infinity
  - 1. Asymptotic behavior
  - 2. End behavior
  - 3. Properties of limits
  - 4. Visualizing limits
- D. Continuity
  - 1. Continuous functions
  - 2. Discontinuous functions
    - a. Removable discontinuity
    - b. Jump discontinuity
    - c. Infinite discontinuity
- E. Instantaneous rates of change and Tangent lines

Unit 3: The Derivative

- A. Definition of the derivative
- B. Differentiability
  - 1. Local linearity
  - 2. Numeric derivatives using the calculator
  - 3. Differentiability and continuity
- C. Derivatives of algebraic functions
- D. Derivative rules when combining functions
- E. Applications to velocity and acceleration
- F. Derivatives of trigonometric functions

Unit 4: More Derivative

- A. The chain rule
- B. Implicit derivatives
  - 1. Differential method
  - 2. $y'$ method
- C. Derivatives of inverse trigonometric functions

D.Derivatives of Exponential and Logarithmic Functions

Unit 5: Applications of Derivatives

A. Extreme values
    1. Local (relative) extrema
    2. Global (absolute) extrema
B. Mean value theorem and Rolle's theorem
    1. Increasing and decreasing functions
C. Analysis of graphs using the first and second derivatives
    1. Critical values
    2. First derivative test for extrema
    3. Concavity and points of inflection
    4. Second derivative test for extrema
D. Optimization problems
E. Linearization models
F. Related rates

Unit 6: The Definite Integral

A. Estimating With Finite Sums
    1. Approximating areas
    2. Volume and sphere
B. Definite Integrals
    1. Riemann sums
    2. Definite integrals
C. Definite Integrals and Antiderivatives
    The Average Value Theorem
D. The Fundamental Theorem of Calculus (part 1)
E. The Fundamental Theorem of Calculus (part 2)
    Trapezoidal rule

Unit 7: Differential Equations and Mathematical Modeling

A. Slope Fields and Euler's Method
B. Integration using *u*-substitution
C. Antidifferentiation by Parts
D. Exponential Growth and decay
    1. Separable differential equations
    2. Newton's Law of Cooling
E. Logistic Growth

Unit 8: Applications of Definite Integrals

A. Integral as a net change
B. Areas in the plane
C. Volumes

    1. Volumes of solids with known cross sections.
    2. Volumes of solids of revolution - Disk method
D. Lengths of Curves.
E. Applications from Science and Statistics.

**Academic Dishonesty**: Any suspicion of academic dishonesty will result in no credit for the paper in question.

**Cell Phones:** The use of cell phones in the classroom is prohibited. Turn the cell phone off or set on vibrate and store it out of sight during class time. Smart watches and Cell phones will be removed from your person on test days.

## Credit Hour Requirement Calculator

| | | | | | |
|---|---|---|---|---|---|
| **Course Information** | | | | | |
| Department, Course Number | | | | Mathematics | MTH2405 |
| Course Title | | | | Calculus | |
| Credit Hours | 4 | | | | |
| Mode of Delivery | Traditional | | | | |
| Weeks in Part of Term | 19 | | | | |
| Level of Reading Material | Advanced/Scientific/Technical (2) | | | 2 | |
| Reading Level of Students | Above Average Student (1) | | | 1 | |
| Average Pages per Hour | 13 | | | | |

*Enter either week or term, not both*

| **Contact Hours** | | **Hours/Week** | **Hours /Term** | **Total Hours** |
|---|---|---|---|---|
| Lecture/Recitation | | 60 | 60 | 60 |

| **Syllabus Items** | **Pages Ass'd** | **Hours/Week** | **Hours/Term** | |
|---|---|---|---|---|
| Weekly Homework Assignments | | 5 | | 75 |
| Prepare for Chapter Tests | | | 12 | 12 |
| Prepare for Final exam | | | 4 | 4 |
| Study Assigned Examples | 80 | | | 6.2 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |

| | |
|---|---|
| **Total Hours** | 153.2 |
| **Required Hours** | 150 |
| **Difference** | Ok + 3.2 |