updated 8-4-2021

Calculus 1 and Analytic Geometry
MTH 244 ME01

Class Time and Location: M T W R F Room 107
Instructor: Bernice Philpot, B.S.E., M.S.E., Henderson State University EdS., U.A. Fayetteville
Office Location: Mena High School, room 107
Office Hours: 2:35 -3:25 Mena High School, Room 107
Contact Information: Cell: (479) 216-4707
Email: Bernice.philpot@menaschools.org

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

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

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***

Program Outcomes: This course 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 (ACT: MTH2405)

Rationale: An objective of post-secondary education is to provide a core of knowledge that is shared with most educated people. By studying and developing a deeper understanding of mathematical computations, students can better analyze, problem solve, and prepare critical thinking strategies for real world scenarios. Technological skills with the graphing calculator are necessary for future math courses.

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.

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.

Course Conduct: 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.

UARM Credit Hour Calculator: For every course credit hour, you should expect to spend at least three clock hours per week of concentrated attention on course-related work, including but not limited to time attending class, as well as out-of-class time spent completing homework, seeking help from instructor or tutors, preparing for upcoming quizzes/tests/exam, reviewing material, problem solving, and organizing your notebook. For a three hour course, a typical student should expect to spend at least nine hours per week dedicated to this course. This includes the time spent in class. Please see the credit hour calculator attached at the end of the syllabus.

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 **upon completion of the AP Calculus Exam :**

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

All students enrolled in blended AP/concurrent courses are required to take the AP Exam to receive college credit.

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 <u>were attempted on a separate sheet of paper.</u>
II. Reflect and tell exactly what was mathematically wrong originally.
III. Take a picture and upload to google classroom. Staple the corrections to the <u>front of the original assignment and place in your 3 ring binder.</u>
IV. Corrections are only graded for **<u>on time assignments.</u>**
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

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 question.

Disability Policy: It is the policy of UA Rich Mountain to accommodate students with disabilities, pursuant to state and federal law. Any student with a disability who needs accommodations should contact the Vice Chancellor for Student Affairs Office, 394-7622, ext. 1400.

Arkansas Clean Air Act: In compliance with the Arkansas Clean Air Act, UARM is a smoke and tobacco free facility. Students and guests are to refrain from the use of all tobacco products while on campus.

Student Misconduct: Students committing misconduct are subject to disciplinary sanction(s) and/or restrictions. Misconduct or prohibited behavior includes, but is not limited to endangerment, harassment, disruption, sexual misconduct, illegal drugs and/or alcohol, fire or safety issues, gambling, property violations, computer violations or other violations as listed in the UARM catalog.

Face Mask Policy: As per the direction of the University of Arkansas Board of Trustees, 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 the 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.

Attendance Policy: It is the student's responsibility to immediately contact the instructor if they will not be present for class.

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

UARich Mountain Mission: The University of Arkansas Rich Mountain provides transformative education to all learners.

Campus Security: UA Rich Mountain strives to provide a safe learning environment; therefore, students who know of any security risk are asked to contact a college official. For more information follow this link and look under the title Health and Safety: http://www.uarichmountain.edu/at-a-glance/disclosures

Cell Phones: The use of cell phones in the classroom is prohibited. Turn the cell phone off or set it 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