Calculus I & Analytic Geometry I (MTH245)
Fall 2023

Class Time and Location: TR 2:00pm – 4:00 pm S 245

Instructor: Damian Maxwell- BSc, The University of the West Indies, Mona Jamaica. MSC, Indiana State University, USA.
Phone: (479) 394-7622 ext. 1335
Email: dmaxwell@uarichmountain.edu
Office Hours: MW 9:25 – 10:55, 12:55 – 4:25 (3:25 on W)
TR 11:55 – 1:55
F 10:00 – 12:00 by appointment

Prerequisites: Grades of C or better in MTH203 (College Algebra) and MTH213 (Plane Trigonometry).

Resources: Text: James Stewart. *Calculus: Early Transcendentials.* 8th ed. Cengage Learning, 2016. ISBN 978-1-285-74155-0

Required Materials:
TI- 84 Graphing Calculator, 3-ring notebook, college rule 3-hole paper, graph paper or graph stamp, cardboard folder, mechanical pencils with extra erasers, small pack colored pencils, pens, straight edge.

Program Outcomes: The knowledge and critical thinking skills acquired in the general education component enable students to analyze problems, to arrive at intelligent conclusions, and to make reasoned choices in their professional and personal lives.

- Use computational mathematics, algebraic operations, and their practical applications to solve problems which they encounter at home and the workplace.
- Possess basic technological skills to identify, locate, and process information.

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.

By studying and developing an ability to apply the mathematical principles of the first course in calculus, MTH245 Calculus I, the student will be prepared to continue in the study of the calculus sequence and to compete academically upon transfer to a four-year institution.

Course Description:

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. (ACTS: MTH2405)

Course Objectives: Upon successful completion of MTH 245 Calculus I 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

Proposed Course Outline: Calculus I

Start Date	Week	Lesson	Topic
8/22	1	2.1	Tangent and Velocity Problems
		2.2	The Limit of a Function
		2.3	Calculating Limits Using Limit Laws
8/29	2	2.4	Precise Definition of a Limit
		2.5	Continuity
		2.6	Limits at Infinity; Horizontal Asymptotes
9/5	3	2.7	Derivatives and Rates of Change
		2.8	The Derivative as a Function
9/12	4	3.1	Derivatives of Polynomials and Exponential Functions
		3.2	The Product and Quotient Rules
		3.3	Derivatives of Trigonometric Functions
9/19	5	3.4	The Chain Rule
		3.5	Implicit Differentiation
		3.6	Derivatives of Logarithmic & Exponential Functions
9/26	6		Test 1 Review
			Test 1
		3.7	Rates of Change in Natural and Social Sciences
		3.8	Exponential Growth and Decay
10/3	7	3.9	Related Rates
		3.10	Linear Approximations and Differentials
		3.11	Hyperbolic Functions
10/10	8	4.1	Maximum and Minimum Values
		4.2	The Mean Value Theorem
10/17	9	4.3	How Derivatives Affect the Shape of a Graph
		4.4	Indeterminate Forms and L'Hospital's Rule
		4.5	Summary of Curve Sketching
10/24	10	4.6	Graphing with Calculus and Calculators
		4.7	Optimization Problems
		4.8	Newton's Method
			Test 2
10/31	11	4.9	Antiderivatives/Integration
		5.1	Areas and Distances
		5.2	The Definite Integral
11/7	12 -13	5.3	The Fundamental Theorem of Calculus
		5.4	Indefinite Integrals and Net Change
		5.5	Substitution Rule
			Test 3
11/21	14		Thanksgiving Break (21-25)
11/28	15		Final Exam Review

Important Dates:

August 21	M	Classes begin
September 4	M	Labor Day holiday (no classes, campus closed)
October 2-6	M-F	Priority Registration for Spring
October 16	M	Mid-semester/first 8-week classes final grades due
November 22-24	M-F	Thanksgiving holidays begin (no classes, offices open W)
December 5	T	Classes end/Last day to drop a class with a W
December 6-12 December 14	W-T T	Final exams (16th week) Grades due

Course Conduct: The class will be taught using a combination of lecture, group interaction, question and answer approach, and independent study. New topics will be demonstrated using the board, overhead document projector, and TI 84+ Smartview computer program for support of graphing calculator use. Students are strongly encouraged to discuss concepts and examples as opportunities are presented during instructor presentation. It is the student's responsibility to inform the instructor when a concept is confusing or otherwise unclear.

UA Rich Mountain 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 four-hour course, a typical student should expect to spend at least twelve hours per week dedicated to this course. This includes the time spent in class.

Course Requirements / Evaluation (Grading):

Tests are 30% of your final grade. Three tests are scheduled.
Class Attendance & Participation 10%
Quizzes 10%
Homework Assignments 15 %
Research & Presentations 15%
Final Exam 20%

The final exam is comprehensive and will include problems from the chapters we have covered in class.

90 – 100 = A 80 – 89 = B 70 – 70 = C 60 – 69 = D 0 – 59 = F

Supplies Needed for daily work: TI-83/84 Calculator supplied by UA Rich Mountain as needed, 3-ring notebook, college rule 3-hole paper, graph paper, cardboard folder, mechanical pencils with extra erasers, pens, yellow highlighter, small pack-colored pencils, small ruler or straight edge.

Criteria for Credit: Homework must be neat and complete. All steps or an explanation of how to arrive at the correct answer must be given. ***Answers alone are not acceptable***. Write the lesson topic at the top of the first page. Leave at least one blank line between problems. All graphs are to be accurately sketched on graph paper with all parts properly labeled and all work for the problem shown on the same page as the graph. For immediate feedback, you may check your answers for most assigned problems in the back of the book. *You will not receive credit for any problems not meeting the criteria for credit described above.*

Title IX and Discrimination Policy: UA Rich Mountain adheres to a policy that enables all individuals regardless of race, color, gender, national origin, age, religion, sexual orientation, veteran's status, or disability, to work and study in an environment unfettered by discriminatory behavior or acts. Harassment of an individual or group will not be condoned, and any person (student, faculty, of staff member) who violates this policy will be subject to disciplinary action.

Harassment that is considered discriminatory includes actions or conduct (verbal, graphic, gestural, or written) directed against any person or group with the intent to demean or create a hostile or threatening environment. It is not the intent of this policy to infringe upon or limit educational, scholarly, or artistic expression. Any person who believes he or she has been discriminated against should contact the Title IX Coordinator to obtain assistance and information concerning the filing of a complaint.

Attendance Policy: For attendance purposes, a student who is displaying symptoms of illness must email: contact.tracing@uarichmountain.edu to determine next steps for an excused absence related to COVID or flu. Contacting an instructor **DOES NOT** start this process or guarantee an excused absence.

Make-up Policy: Make-up exams are given only in instances of the most unavoidable, serious circumstances. Prior notice of absence from an exam is required and the request must be approved by the instructor.

Assignment Due Dates: Students are expected to submit the assignments and other works on or before the assigned due dates. You will be penalized for the late works depending on the number of days and full point and importance of the works assigned.

Computer and On-Campus Resources: Computer labs with printers are available in several places on campus including the Johnson Learning Commons. UA Rich Mountain offers students assistance with quality tutors available in the Student Support Services (SSS) and Learning Enrichment and Counseling Center (LEAC) in the Johnson Learning Commons. You may access www.tutor.com/uarichmountain at nights and weekends when SSS is not available.

Cell Phones: The use of cell phones in the classroom is prohibited. Turn cell phone off or set on vibrate and store it out of sight during class time.

Academic Dishonesty: Any suspicion of academic dishonesty will result in no credit for the paper in question. The use of ChatGPT or any other AI program to generate your work in any manner is strictly prohibited in this class and constitutes academic dishonesty. This action will be subject to the penalties of the academic dishonesty policy.

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. 1460.

Arkansas Clean Air Act: In compliance with the Arkansas Clean Air Act, UA Rich Mountain 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 UA Rich Mountain catalog.

UA Rich Mountain Mission: UA 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 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

Credit Hour Requirement Calculator

Course Information				
Department, Course Number	Mathematics			
Course Title	Calculus			
Credit Hours	4			
Mode of Delivery	Traditional			
Weeks in Part of Term	15			
Level of Reading Material				
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
	Pages Asg'd	**Hours/Week**	**Hours/Term**	
Syllabus Items				
Weekly Homework Assignments		5		75
Prepare for Chapter Tests			12	12
Study Assigned examples	80			6.2
				0
				0
Total Hours				153.2
Required Hours				150
Difference				Ok + 3.2