UNIVERSITY OF GUAM
UNIBETSEDÅT GUAHAN

COLLEGE OF NATURAL & APPLIED SCIENCES
Division of Mathematics & Computer Sciences

Course: MA 205: Multivariable Calculus (4 credit Hours)

Semester: Fall 2023

Class Meeting: M T W 12:30 – 1:50 **RM:** WB 3

Instructor: Raymond Paulino, Ph.D.
Office: WB Annex Rm 9
Phone: 671-735-2833
Email: paulinor4388@triton.uog.edu

Office Hours: M T W Th: 11:30-12:30, T: 2:00-3:00, and Th: 12:30-1:30
All other times by appointment upon request

Moodle Key: MA20501-fa23-tIULW

Catalogue Course Description:
This course covers the calculus of *functions of several variables*, including *partial differentiation* and *multiple integration*. Prerequisite: Grade of C or better in MA 204.

Course Content:
The course covers: vectors, vector-valued functions; differential calculus of functions of several variables; multiple integration; vector integral calculus which includes line integrals, line integrals independent of path, surface integrals, divergence and curls, integral theorems and other topics.

Rationale for Offering the Course:
This course is the third in a sequence of calculus studies. The basic content of the course is needed by any student who is planning to continue in mathematics. The ideas introduced in this course provide a *foundation for all upper division mathematics courses.*

Format/Activities in the Class:
You are expected to attend each class session. Learning mathematics requires that you study and practice mathematics *every day*. *Dialogue and cooperative learning* is encouraged. Please, make effort to come to the board and my office hours frequently to share your solutions. You will learn *clear communication* of your ideas.

Textbook:
Multivariable Calculus by Stewart, 7th edition. We will cover most of *Chapters 12-15,* and parts of *Chapter 16*.

Due Dates, Make ups, Attendance:

For Extenuating circumstances that you need to miss a quiz or exam, then I will allow you to do makeup if I decide that you have a valid excuse. If your excuse is valid then I will let you know how to do a makeup.

You must notify me at least one week before you do the makeup. ←VERY IMPORTANT, do not wait till the last day of class. A student who has missed 22 class sessions (excused or unexcused), will be automatically given a course grade of an F.

Working together
You are encouraged to choose one or more *study partners* to learn together. While working together is encouraged, please note that all work, quiz or test you hand in must reflect *your own individual efforts*. Keep in mind that the scores, including your overall semester score that you earn, will be in direct correlation with the individual effort you invest in studying your subject.

Assignments, Quizzes, Exams: You will have to *read the textbook for each class in advance* and review the section. You need to do *all homework assignments.*

Homework is an essential component of the course. To be successful, a student must complete all assigned homework even if it is not collected or graded. You are advised to keep your assignments in a notebook for classroom reference, questions, or review for tests. **A list of HW problems from the book is given in the MA205 Suggested HW Problems pdf file, see top of our Moodle course page. I will ask you to present some in class for HW and Participation points.**
It is important to read ahead a few pages of the textbook before coming to class.

Quizzes and Exams: Each week there will be either a quiz or an exam. The exam problems will be from the quizzes, and the quiz problems will come from or similar to the homework.

Quizzes and Exams wills be either one of the following **types**:
Type 0. In Class, Closed notes & book. No calculator, computer internet, and outside communication.
Type 1. In Class with open notes, book, and calculator allowed, but no communicating with others.
You may use your laptop or iPad but must show me that you're offline.
Type 2. In Class with option to take home. If you finish before class time ends, then you will get 10% extra credit.
Type 3. Take home

I will let you know ahead of time, which type of Quiz/Exam it will be.

Please come to Office Hours after you get your quizzes and exams back so I can help you improve and fix your mistakes. Various extra credit opportunities are given throughout the course and announced in class.

EVALUATION AND GRADES:

-	Midterm Exams:	40% (2-3 midterms)
-	Final Exam:	20%
-	Quizzes	25% (10-12 quizzes)
-	HW and Participation	15%
	Total:	100%

Letter grades will be assigned as follows:

98 – 100%	A+	4.0
93 – 97%	A	4.0
90 – 92%	A-	3.67
87 – 89%	B+	3.33
83 – 86%	B	3.00
80 – 82%	B-	2.67
77 – 79%	C+	2.33
70 – 76%	C	2.00
60 – 69%	D	1.00
0 – 59% F	F	0

ACADEMIC DISHONESTY: Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper or project, failure in the course and/or expulsion from the University and a letter placed in your permanent file. For more information refer to the academic dishonesty policy in the University handbook.

COURSE POLICIES:
Attend each class on time, participate and do the coursework. If you cut a class, it is *your responsibility* to make up any missed class material. Cell phones, or any distractive devices must be *turned off* in the classroom. Be courteous in class, respect and pay attention to your instructor/classmate who works at the board. *Focus on learning* so that your understanding benefits the most from your participation in the class activities. *Academic dishonesty* and *plagiarism* are serious violations of university policy, punished by failing grade and/or suspension. *Never cheat* and *never be dishonest*!

DROP DATE:
Please see the current UOG Course Schedule for the last days to withdraw. Voluntary Withdrawal is now done online. Contact the academic advisor or registrar's office on how to proceed.

FOR CLASSMATES:
You are encouraged to exchange *contact information* with your classmates. Choose at least one *study partner*. Contact your classmate(s) if you miss a class and make up the missed material. You are also encouraged to form *study groups.* List here some contact information from your classmates:

STUDENT WORK LOAD:
Read all sections covered every day, work all homework and worksheet problems assigned on a daily/weekly basis, work on all review problems assigned for scheduled exam.

Your Math Resources: There are several campus resources available to you if you need extra help with any of the course material.
• Your instructor! Make an appointment to meet with me.
• The Math Tutor Lab! The CNAS Math Tutor Lab is located at the Agriculture and Life Sciences Building in Room 230 (ALS230). For more information, please call 735-2064, email mathtutorlab@triton.uog.edu or visit the tutor lab website www.uogmathlab.org

Intended Student Learning Outcomes (SLOs):

After completing the course, successful students will be able to:

- *MA 205 SLO1 – demonstrate* knowledge of the theory and applications of functions of several variables and vector-valued functions;
- *MA 205 SLO2 – apply* differential calculus, multiple integrals and vector integral calculus to *solve* optimization, extreme value and other application problems;
- *MA 205 SLO3 – perform* partial differentiation, *compute* total and directional derivatives;
- *MA 205 SLO4 – use* line integrals and surface integrals to *gain insight* of vector fields;
- *MA 205 SLO5 – describe* divergence and curl in the context of general integral theorems.

Mathematics Program Learning Outcomes (PLOs):

Students completing the mathematics program at the UOG will:

- *MA PR PLO1 – demonstrate* critical thinking, problem solving skills and ability to *use* mathematical methods by identifying, evaluating, classifying, analyzing, synthesizing data and abstract ideas in various contexts and situations;
- *MA PR PLO2 – exhibit* a sound conceptual understanding of the nature of mathematics, and *demonstrate* advanced mathematical skills in mathematical analysis, modern algebra and other mathematical discipline(s);
- *MA PR PLO3 – argue* and *reason* using mathematics, read, *create* and *write* down logically correct mathematical proofs, *use* exact mathematical language and *communicate* mathematics efficiently orally, in writing and using information technology tools;
- *MA PR PLO4 – apply* abstract thinking, mathematical methods, models and current practices in the sciences, including state-of-the-art mathematical software, to solve problems in theoretical mathematics or in a diverse area of mathematical applications;
- *MA PR PLO5 – show* maturity in mathematical knowledge and thinking that prepares and encourages students to pursue graduate studies in mathematics or in related fields;
- *MA PR PLO6 – demonstrate* an appreciation of and enthusiasm for inquiry, learning and creativity in mathematical sciences, a sense of exploration that enables them to pursue lifelong learning and up-to-date professional expertise in their careers through various areas of jobs, including governmental, business or industrial jobs in mathematics, related sciences, education or technology.

UOG Institutional Student Learning Outcomes (ILOs)

For more information about the following ILOs, please refer to www.uog.edu/adminstration/academic-and-student-affairs/accreditation/assessment-and-program-review.

ILO-1 Mastery of critical thinking and problem solving

ILO-2 Mastery of quantitative analysis

ILO-3 Effective oral and written communication

ILO-4 Understanding and appreciation of culturally diverse people, ideas and values in a democratic context

ILO-5 Responsible use of knowledge, natural resources, and technology

ILO-6 An appreciation of the arts and sciences

ILO-7 An interest in personal development and lifelong learning

Academic Integrity Policy

Academic Integrity is about performing in your role as student in ways that are honest, trustworthy, respectful, responsible, and fair (see www.academicintegrity.org for more information). As a student, you will complete your academic assignments in the manner expected by the instructor. Academic dishonesty, including but not limited to cheating and plagiarism may result in suspension or expulsion from the University. Refer to the UOG Student Handbook and Code of Conduct for more information.

Tobacco Policy

The University of Guam is a tobacco-free campus and has a total ban on sales, smoking, distribution and use of tobacco and tobacco-based products on campus. UOG is committed to promoting the health, wellness and social well-being of the University Community, the people of Guam and the Western Pacific.

Special Accommodations:

For individuals covered under the ADA (Americans with Disabilities Act), if you are a student with a disability requiring academic accommodation(s), please contact the Disability Support Services Office to discuss your confidential request. A Faculty Notification letter from the Disability Support Services counselor will be provided to me. To register for academic accommodations, please contact or visit Sallie S. Sablan, DSS counselor in the School of Education, office 110, disabilitysupport@triton.uog.edu or telephone/TDD 671-735-2460.

Notification of Rights Under FERPA

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights for students, parents and school officials can be viewed at http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html.

MA 205 Tentative course calendar:
(see Moodle for a more detailed schedule)

Week of (Mondays)	**Topics**
8/14	First day is Tuesday 8/19 *Chapter 12: Vectors and the Geometry of Space* 12.1 Three-dimensional coordinate Systems 12.2 Vectors
8/21	12.3 The dot product 12.4 The cross product
8/28	12.5 Equations of lines and planes 12.6 Cylinders and quadric surfaces
9/4	***Holiday: No class on Monday 9/4*** ***Labor Day*** Start *Chapter 13: Vector Functions* 13.1 Vectors functions and space curves 13.2 Derivatives and Integrals of vector functions
9/11	13.3 Arc length and curvature Review for Exam 1
9/18	**Exam 1** Start Chapter 14: Partial Derivatives 14.1 Functions of several variables
9/25	14.2: Limits and continuity 14.3: Partial Derivatives
10/2	14.4: Tangent planes and linear Approximations 14.5 The Chain Rule
10/9	***Fanuchanan Break: No Classes from 10/9-10/14***
10/16	14.6 Directional derivatives and the gradient vector 14.7 Maximum and minimum values
10/23	Chapter 15: Multiple Integrals 15.1 Double integrals over rectangles
	Review for Exam 2

10/30 Exam2

15.2 Iterated Integrals

15.3 Double integrals over general region

Holiday: All Soul's Day Thurs. 11/2

11/6 15.4 Double integrals in polar coordinates

15.6 Surface area

Holiday: Veteran's Day Fri. 11/10

11/13 15.7 Triple integrals
15.8 Triple integrals in cylindrical coordinates

11/20 15.9 Triple integrals in spherical coordinates
15.10 Change of variables in multiple integrals

Holiday: Thanksgiving Holiday and Break 11/23-11/25

Faculty Evaluations: 11/20 – 12/7

11/27 Chapter 16: Vector Calculus Vector fields
16.1 Line Integrals
16.2
16.3
16.4
Review for Final and/or Continue Ch. 16

12/4 Review for the Final
Last day of Instruction is 12/6 (Wednesday)

Holiday: Our Lady of Camarin Day 12/8

12/11 Final Exam Week
MA 205 Final Exam TBA

REDO and REVISION Policy for MA 205:

- You can redo a total of **Seven problems** from any of the Quizzes. I decide on what count as "One problem". This depends on certain quizzes. It can be number labeling, or if a quiz consists of many parts (letter labeling a,b,c,), then I will let you know which counts as "One" problem".

- Redo is different from Make-Up work. For Excused Absence, you can make up the work first and then redo a problem later if it is not passed the deadline to redo. For Unexcused Absence, you cannot make up and cannot redo a problem.

- You can redo "**One problem**" in Exam 1 and another in Exam 2. But no redoes on the Final Exam. I decide on what counts as "One problem".

- To submit your redo, you must first discuss with me during class or during my office hours, and then you can submit the correction.

- The deadline for redoes for a quiz or exam will be announced in class.

Learning is all about revision.