MATH 3303: Multi-Variant Calculus

Sul Ross State University ~ Rio Grande College
Fall 2014

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Course Description	MTH 3303 is intended as an introduction to multi-variant calculus, including multiple integrals, partial derivatives, vectors, derivatives and integrals of vector fields.
Course Objectives	Students will explore parametric equations and curvilinear motion, vector arithmetic and the geometry of space, vector-valued functions and their uses in mathematical physics, functions of several variables, multiple integratals, and vector analysis.
Mathematics Program Outcomes	The graduating student will be able to demonstrate content knowledge in mathematics including arithmetic, algebra, geometry, probability, statistics, and calculus.
Class Time	Monday & Wednesday, 4:30 – 5:45 p.m.
Class Location	Del Rio 107; Eagle Pass B112; Uvalde B114c
Required Text	Morris Kline, *Calculus: An Intuitive and Physical Approach*, ISBN 0486404536
Office Hours	Monday – Thursday, 10:00 a.m. – 12:00 p.m., or by appointment, or basically whenever I'm in my office and not too busy.

Course Policies

Attendance Policy

Attendance is mandatory. You will be held responsible for all material covered in class or in the reading assignments. If you have to miss a class, it is your responsibility to obtain all notes, assignments, and announcements from someone else in the class. Make-up exams will be given only in the event of an emergency, in which case written justification and/or documentation must be provided and approved.

Communication

I will post course documents, reminders, announcements, and assignments on the Blackboard system. I may also occasionally send announcements via e-mail. You should make sure you know how to access and use these tools. E-mail is the best way to contact me.

You are welcome to stop by my office if you need help with the homework or wish to speak about your progress in the course. If you would like to meet with me and can't travel to Uvalde, please let me know, and we will try to arrange an appointment at your site.

I am here to help you. Ask questions in class, call me, e-mail me, or come to my office. If you don't communicate with me, then I can't help you.

Homework

Homework will be assigned for each section that we cover in the text. Although the homework will not be graded for correctness, you should regard it as the most essential component of the course. It is very important that you complete each homework assignment before the next class period. This will allow you to make the most of our time together. We will always have time in class to discuss the homework.

During the final weeks of the semester you will turn in a homework folder. This should contain every assigned homework **in order**, with **all the work shown**. Solutions with just the answers will not receive credit. These will be graded for completeness, not correctness.

The folder is due Monday, November 24.

Semester Project

In addition to the regular homework, you will be asked to complete a paper on Kepler's Laws of Planetary Motion. You will be given specific guidelines in the form of a series of questions. Your paper should include both written exposition and mathematical computations, written so that someone with a basic calculus background who doesn't know anything about Kepler's Laws could read it.

There is no minimum length, but your paper must answer all questions posed in the guidelines in a consistent, coherent manner, and not as though you were merely working a sequence of exercises. It must be prepared as a .docx file on Microsoft Word using 12-point Cambria font, double-spaced, with page numbers and 1-inch margins. Use the Equation Editor for mathematical text.

Much of the information can be found in the textbook, but you may need to consult outside sources as well. You are not allowed to use any online sources. All sources must be acquired through the junior college or university library. A Works Cited page should be provided at the end of your paper.

Your paper will be graded for mathematical correctness as well as for proper grammar, usage, and organization. Please make use of Smarthinking or the Writing Center if you need writing assistance. All sources must be correctly cited and all quotes or paraphrases attributed to their source. Quoting or paraphrasing a source without proper citation is known as plagiarism. **Plagiarism is a serious offense and will result in a failing grade for the course.**

You may work in pairs if you wish, but the workload must be evenly divided. If you wish to work with a partner, please let me know by the end of September.

A first draft must be submitted by Monday, November 17. I will provide feedback – the more complete your draft is, the better your final grade will be. If you would like to submit your first drafter earlier then you may do so. The final version must be handed in by Wednesday, December 3.

Grading Policy

Your grades will be weighted as follows:

Homework Folder	10%
Paper	20%
Midterm Exam	30%
Final Exam	40%

A student who averages at least 90% will receive an A; at least 80% will receive at least a B; at least 70% will receive at least a C; at least 60% will receive at least a D.

Exams

There will one midterm exam. The tentative date is October 15. This is subject to change. You will be notified of a change at least one week in advance. Make-up exams will be given only in the event of an emergency, in which case written justification and/or documentation must be provided and approved.

Implicit in registering for this course is your agreement that you will be present to take the final exam at the time determined by the University, which is Monday, December 8, from 3:00 – 5:45. The final exam will be comprehensive.

Dates to Remember

October 15	tentative midterm exam date
November 17	deadline to turn in first draft of paper
November 24	homework folder due
December 3	paper due
December 8	final exam

Subject Outline

Below is a tentative outline of the subjects we will cover in this course.

I. Polar Coordinates: *the polar coordinate system – curves in polar coordinates – conic sections in polar coordinates – relation with rectangular coordinates – the derivative of a function in polar coordinates – area and arc length*

II. Rectangular Parametric Equations and Curvilinear Motion: *parametric equations of a curve – projectile motion – slope, area, and arc length – curvature – vector arithmetic – velocity and acceleration – tangential and normal acceleration*

III. Kepler's Laws: *polar parametric equations – velocity and acceleration – Newton's laws of motion and gravitation – Kepler's laws of planetary motion*

IV. Multivariable Functions: *functions of two or more variables – Cartesian coordinates – planes – lines – quadric surfaces*

V. Partial Differentiation: *basic definition – geometric meaning – the directional derivative – the chain rule – maxima and minima – envelopes*

VI. Multiple Integrals: *volume under a surface – the double integral – triple integrals*

Schedule

This schedule is tentative only. The unit numbers refer to the above outline.

Unit I	August 25 – September 3
Unit II	September 8 – 24
Unit III	September 29 – October 13
Midterm Exam	October 15
Unit IV	October 20 – 29
Unit V	November 3 – 17
Thanksgiving Break	November 26
Unit VI	November 19 – December 1
Review	December 3
Final Exam	December 8

Americans With Disabilities Act

Sul Ross State University is committed to equal access in compliance with the Americans With Disabilities Act of 1973. It is the student's responsibility to initiate a request for accessibility services. Students seeking accessibility services must contact Kathy Biddick, Student Services Administrative Secretary.