

# MATH 3404 – Multivariate Calculus

## Fall 2008

**Instructor:** Dr. Casey Mann

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**Course Blackboard Names and Access Codes (enroll by appropriate section):**

2008-FALL-MATH-3404.001 - Multivariate Calculus      Access Code: 3404.001

2008-FALL-MATH-3404.002 - Multivariate Calculus      Access Code: 3404.002

**Required Text:** Essential Calculus, Early Transcendentals by J. Stewart, ISBN: 0495014281

**Office Hours:** MWF 8:00 a.m. - 9:30 a.m., MWF 1:15 p.m. - 2:00 p.m., or by appointment

### Prerequisites

Equivalent of Math 2414 – Calculus II (with grade of C or better)

### Description of Course

Vector calculus in Euclidean n-space, functions of several variables, partial differentiation and multiple integration.

### Grades

Your grade will be calculated using the following percentages.

In-Class Exams	40%
Homework/Daily Quizzes	25%
Final Exam	35%

The grade scale will be as follows:

90% to 100%	=	A
80% to less than 90%	=	B
70% to less than 80%	=	C
60% to less than 70%	=	D
less than 60%	=	F

### Daily Work

You can expect a quiz each time class meets, except for days of exams. These quizzes will cover the previous day's lecture and homework assignment. The lowest three daily quiz scores will be dropped. There will be other written assignments (homework, projects, etc). The details of these assignments will be announced during in class. **Daily work will account for 25% of your overall grade, so you should plan on staying on top of your homework.**

### Make-Up Policy

Make-ups for **documented** absences that are *required* as part of a UT Tyler obligation (e.g. athletes participating in an event, participating in a debate contest, etc.) will be granted. For all make-ups of this type, prior notification and at least one week and documentation are required. Except for absences resulting from required UT Tyler obligations, make-ups are granted only in the most extreme cases and at the sole discretion of the instructor.

### Dropping the Course

The last day to drop any course is **October 31**. You cannot get a "W" after this date.

## Calculators

A calculator is not needed for this course and are not allowed on exams. You are, however, provided with access to computers with Mathematica, and you are encouraged to check homework problems, make graphs, and experiment using Mathematica. Additionally, you are encouraged to enroll in MATH 3104 – Multivariate Calculus Computer Lab (this course is required for math majors and should be taken concurrently with MATH 3404).

## Attendance

Attendance is required. Attendance will be recorded for each period – **be there on time and stay there the whole time**. Two tardies will count as one absence. Leaving early counts as an absence. Excessive absenteeism will impact your overall grades. Specifically, a fourth absence will result in your grade for the course being lowered by one letter grade; a sixth absence will result in a two letter grade reduction, and eight absences will result in an F for the course. The student will be responsible for missed due dates, missed lectures, and missed notes.

- Absences due to required university events are excused and do not count toward your number of absences for the semester. For example, if you are on the baseball team and must miss class to go to a game, that is excused. If you are a baseball fan and want to go watch the team play, that is not excused.
- Do not view the first three absences as “vacation days.” You are allowed these three days so that if any emergencies, funerals, car troubles, failing alarm clocks, or other unforeseen tragedies strike, you have a reasonable number of days you may miss to account for this. Frequently, students miss three times for reasons of questionable legitimacy, and then later a honest-to-goodness problem happens which causes an absence. It doesn’t matter if your dog died and you need to be at the funeral, if you already used up your first three absences, you still get your grade lowered by one letter grade! You must use your three absences wisely!
- If for legitimate reasons you must be absent more than three times, you may be granted an exception to the policy, but ALL of your absences for the semester must be legitimate.
- When possible, you need to be able to document your absences (e.g. doctor’s notes).
- It is very important to communicate with your instructor about all absences. If you know ahead of time that you will miss due to some scheduled event (e.g. dental appointment), then let your instructor know ahead of time. This will allow the instructor to give you a chance to make up any missed assignments or exams. If you miss due to some unforeseen problem, you should let the instructor know ASAP. For example, if you miss class on Monday and a test was given on Monday, don’t just wait and show up on Wednesday and say “I’m here! Where is my make-up test?” In such a situation, you need to contact your instructor at the first possible moment to tell him of your absence and explain why you missed so that he can decide if your reason merits a make-up. Moreover, it is well-known by instructors that students sometimes miss class on test days to buy time to study or to get information about the exam from a classmate. You will be expected to make up any missed exams at the earliest possible time, possibly on the same day.
- Many excuses for missing class are simply not legitimate. Some examples include the old “the alarm clock didn’t go off,” incarceration, work conflicts, can’t find a ride, want to attend friend’s wedding, etc. In these cases, you will not be granted make-ups for exams or other assignments.
- In general, by signing up for this course, you are committing to be in class every day. You are committing to not allow other things in your life interfere with this course. If you cannot strike a balance between work and this course, then you must choose which is more important. If you cannot strike a balance between your social obligations (parties, funerals, weddings, vacations, etc.), then you must choose which is more important. This course, however, demands that you must give it priority, or else you should drop it as you probably will not pass.

## Final Exam

The final exam will be comprehensive (meaning it covers all the material from the course). It will not be administered at the regularly scheduled time: The final exam will be given on **Wednesday, Dec. 17, 5:00 p.m. – 7:00 p.m.** Make-ups will be granted for the final exam if this time is in conflict with another regularly scheduled final exam or if moving the final exam to this day causes you to have three or more final exams on that day. Make-up exams will not be granted for any other reasons. All make-up exams will be taken on Thursday, Dec. 18.

## Getting Help

You should not hesitate to come visit with your professor to get help, either during regularly scheduled office hours or by appointment. This is why he is paid the big bucks. Your professor maintains an open door policy – if the door is open, come on in! If your professor is not available, you can get free help from the tutors in the Mathematics Learning Center (RBN 4021). Given the slightly advanced nature of this course, it is possible that some of the tutors are unable to help you there, but many can. Additionally, the MLC is where you can get computer access and where you can meet with other students to study. Please be courteous to the other MLC patrons by using your “inside voice!”

## Disability Statement

If you have a disability, including a learning disability, for which you request disability support services and/or accommodation(s), please contact Ida MacDonald in the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting disability support services/accommodation(s) must provide appropriate documentation of his/her disability to the Disability Support Services counselor. In order to assure approved services the first week of class, diagnostic, prognostic, and prescriptive information should be received 30 days prior to the beginning of the semester services are requested. For more information, call or visit the Student Services Center located in the University Center, Room 282. The telephone number is 566-7079 (TDD 565-5579). Additional information may also be obtained at the following UT Tyler Web address: <http://www.uttyler.edu/disabilityservices>.

## Social Security Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number.

## Note Regarding Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor by the second class meeting of such absences.

## Grade Replacement

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by census date (Sept. 10). Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grade point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2008-2010 Catalog, p. 26)

## Tentative Class Outline and Schedule

Date:	Topic:	Date:	Topic:
Aug 27	10.1 – 3-D Coordinate Systems	Oct 27	12.5 – Triple Integrals
Aug 29	10.2 – Vectors	Oct 29	
Sept 1	Labor Day (no class)	Oct 31	12.6 – $\iiint$ in Cylindrical Coordinates
Sept 3	10.3 – The Dot Product	Nov 3	12.7 – $\iiint$ in Spherical Coordinates
Sept 5	10.4 – The Cross Product	Nov 5	*12.8 – Change of Variables
Sept 8	10.5 – Equations of Lines and Planes	Nov 7	
Sept 10	10.6 – Cylinders and Quadric Surfaces	Nov 10	<b>Exam 3: Ch. 12</b>
Sept 12	10.7 – Vector Functions and Space Curves	Nov 12	13.1 – Vector Fields
Sept 15	10.8 – Arc Length and Curvature	Nov 14	13.2 – Line Integrals
Sept 17	*10.9 – Motion in Space	Nov 17	13.3 – The Fund Thm for Line Integrals
Sept 19		Nov 19	
Sept 22	<b>Exam 1: Ch. 10</b>	Nov 21	13.4 – Green’s Theorem
Sept 24	11.1 – Functions of Several Variables	Nov 24	13.5 – Curl and Divergence
Sept 26	11.2 – Limits and Continuity	Nov 26	Thanksgiving
Sept 29	11.3 – Partial Derivatives	Nov 28	Thanksgiving
Oct 1	11.4 – Tangent Planes	Dec 1	13.6 – Parametric Surfaces
Oct 3	11.5 – The Chain Rule	Dec 3	13.7 – Surface Integrals
Oct 6	11.6 – Directional Derivatives	Dec 5	13.8 – Stokes’ Theorem
Oct 8	11.7 – Maximum and Minimum Values	Dec 8	13.9 – Divergence Theorem
Oct 10	*11.8 – Lagrange Multipliers	Dec 10	
Oct 13		Dec 12	<b>Exam 4: Ch. 13</b>
Oct 15	<b>Exam 2: Ch. 11</b>	Dec 15	
Oct 17	12.1 – $\iint$ over Rectangles	Dec 17	<b>Final Exam, 5:00 p.m. – 7:00 p.m.</b>
Oct 20	12.2 – $\iint$ Integrals over General Regions		
Oct 22	12.3 – $\iint$ Integrals in Polar Coordinates		
Oct 24	12.4 – Applications		

This is a *tentative* schedule. Test dates, topics covered, etc., are likely to change. Definite test dates will be given in class at least one week prior to each test.

\* indicates sections which may be dropped in the interest of time.

## Student Learning Outcomes

By the end of this course, the successful student will have the following skills:

- Be able to compute calculus operations on vector-valued functions, including derivatives, integrals, the TNB frame, curvature, velocity, acceleration, and torsion.
- Be able to compute calculus operations on functions of several variables, including partial derivatives, directional derivatives, find extrema, find tangent planes, and multiple integrals.
- Be able to demonstrate knowledge of the important theorem of vector calculus by solving problems using the Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, and the Divergence Theorem.
- Be able to apply the computational and conceptual skills obtained from this course to solve applied problems.