

**Texas Tech University, Department of Mathematics and Statistics**  
**MATH 2450, Calculus III with Applications**  
**Fall 2012 COURSE SYLLABUS, Sections #014 and #016**

## **Instructor**

Giorgio Bornia, Visiting Assistant Professor  
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Office hours: MTW 10:00am-11:30am or by appointment.

## **Weekly meeting**

Section #014: MW 08:00am-09:50am, room MATH 109  
Section #016: MW 12:00pm-1:50pm, room MATH 013

## **Textbook**

*CALCULUS, 5th Edition*, by Strauss, Bradley, Smith. Chapters 9, 10, 11, 12 and 13.

## **Topics**

Vector calculus, partial differentiation, functions of several variables, multiple integrals, line integrals, surface integrals, Stokes theorem, divergence theorem. Applications and problem-solving are strongly emphasized. Partially fulfills Core Mathematics requirement.

## **Mission Statement**

This course covers Calculus of several variables. The concepts are extensions of the concepts from previous Calculus courses. It is necessary to remind the students of those basic concepts, as the course progresses. Multivariable Calculus is an important tool in Science and Engineering. The instructor should emphasize the importance of all relevant concepts, including: curves and surfaces in Euclidean 3-space, length and curvature, area and volume; surfaces, partial derivatives, total differential, tangent planes to surfaces; gradient; vector-valued functions; path integral; Stokes' theorem, which should be stated, with an emphasis on its important particular cases, Green's Theorem and Divergence Theorem - followed by a few basic examples. This course is organized as a four hour lecture for the regular academic year (Fall and Spring) and the corresponding amount of hours for each Summer Session. Every week, the first three hours will be devoted to covering the material from the text-book. The fourth hour will be exclusively dedicated to applications, examples and exercises that are relevant to the learning objectives, and improve the student success in the examinations. Depending on availability of academic facilities, the fourth hour of lecture can be held in a regular classroom, a lecture hall, or a computer lab, where the students will follow the instructor's presentation and become actively involved in problem-solving at the same time.

## **Student Learning Outcomes**

Math 2450 satisfies the university core curriculum requirement in Mathematics: "Students graduating from Texas Tech University should be able to demonstrate the ability to apply quantitative and logical skills to solve problems." It meets the TTU general education student learning outcomes for mathematics that students will:

- apply arithmetic, algebraic, geometric, statistical and logical reasoning to solve problems;
- represent and evaluate basic mathematical and/or logical information numerically, graphically, and symbolically;
- interpret mathematical and/or logical models such as formulas, graphs, tables and schematics, and draw inference from them.

Students develop skills in differentiation and integration needed to solve problems in 3-dimensional space. In particular the students will master the concepts of

- tangent and normal vectors, and their geometric and physical interpretations;
- partial derivatives, tangent planes, directional derivatives, and gradients, and how to compute them;
- three-dimensional integration, and how to compute such integrals;
- vector fields, divergence, and curl, and how to calculate them.

## **Assessment of the Learning Outcomes**

### **Homework**

It will be given regularly through the WebWork system:  
<http://webwork.math.ttu.edu/webwork2/f12gborniam2450s014s016>.

Students will be informed by the instructor and via email (on the @ttu.edu address) about the homework, which should be completed before the given deadline (generally not more than 10 days). Many of the homework problems will be discussed in class at a later time. Homework is worth 20% of the final grade.

## Examinations

- Exam #1: **September 17th, Monday**, worth 10% of the final grade
- Exam #2: **October 10th, Wednesday**, worth 15% of the final grade
- Exam #3: **November 5th, Monday**, worth 15% of the final grade
- Exam #4: **November 28th, Wednesday**, worth 15% of the final grade
- Final Exam: **December 7th, Friday, 10:30am-1:00pm**, worth 30% of the final grade

Use of calculators and formula sheets in all the exams is not permitted. Electronic devices which can store formulas, including cell phones, should be turned off and stored during the exams.

## Grading Policy

Less than 60% F, 60-69% D, 70-79% C, 80-89% B, 90-99% A, more than 100% A+

## Make-ups

There are no make-ups for the examinations, except for reasons of illness, stated in writing by a medical doctor, or observance of a religious holiday. Usually, no other reasons are accepted (events, plane tickets, weddings, ...).

## Attendance and Class Policies

Attendance is mandatory. Students with less/equal than 4 missed hours for the entire semester will receive a bonus of 3% on the final grade. This course moves very fast. If you fall behind, even by one section, you may not be able to catch up, since each section generally depends very heavily on the ones before. I expect that students will read each section of the textbook in advance of the lecture. You must also attend every class. If you miss a class, it is your responsibility to find out what you missed (announcements, assignments, notes ...).

Classes start and end always on time. Students are not allowed to leave the class before the end of the hour without authorization. During class time it is not allowed to text, chat and sleep. Please put in silent mode all your electronic devices.

## Additional material

The instructor may send links to videos for most sections covered. Many of the videos you will see belong to the following public courseware: <http://www.khanacademy.org/>. Feel free to browse for other online sources.

## TTU Operating Policies

### Americans with Disabilities Act (TTU OP 34.22)

Any student who, because of a disability, may require some special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services, during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405.

### Absence for observance of a religious holy day (TTU OP 34.19)

1. "Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code 11.20. 2. A student who intends to observe a religious holy day should make that intention known to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. 3. A student who is excused under Section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

### Academic Honesty (TTU OP 34.12)

It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension. "Scholastic dishonesty" includes, but it not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act.

## The grade of "I" (TTU OP 34.12)

The grade of "I" is given only when a student's work is satisfactory but, due to reasons beyond his or her control, cannot not be completed. It is not given in lieu of an "F" or "W". The instructor assigning the grade will stipulate in writing at the time the grade is given the conditions under which the "I" may be removed. The assigned work and a change of grade must be recorded within one calendar year from the date of the "I". Failure to do so results in an "F" for that course.

## Important dates

Please note the following important dates:

- **September 12th, Wednesday:** last day for student-initiated drop without a penalty (drop does not count against drop limit).
- **October 29th, Monday:** last day for student-initiated drop with a penalty (counts against drop limit). After the deadline, the student must complete the course for a grade.

The 2012-2013 official calendar can be found at:

<http://www.depts.ttu.edu/officialpublications/calendar/12-13calendar/12-13detailed.php>

## Tentative schedule

Hours	Topic	Sections
2	Review of Vectors in $R^2$ and $R^3$ , Scalar and Cross Products	9.1-9.4
1	Parametric Representation of Curves	9.5
1	Planes in $R^3$	9.6
1	Introduction to Vector Functions	10.1
1	Vector Function Differentiation and Integration	10.2
1	Ballistic Modeling	10.3
2	Unit Tangent and Principal Unit Normal Vectors, Curvature	10.4
1	Review of Chapters 9 and 10	
1	Exam #1	
2	Quadric Surfaces, Functions of Several Variables	9.7,11.1
1	Limits and Continuity	11.2
1	Partial Derivatives	11.3
2	Tangent Planes and Differentiability	11.4
2	Chain Rules	11.5
2	Directional Derivatives and Gradient	11.6
2	Extrema of Functions of two variables and Lagrange Multipliers	11.7-11.8
1	Review of Chapter 11	
1	Exam #2	
1	Double Integration over rectangular region	12.1
2	Double Integration over non-rectangular region	12.2
2	Double Integration in Polar Coordinates	12.3
2	Surface Area	12.4
2	Triple Integrals	12.5
2	Cylindrical and Spherical Coordinates	12.7
1	Jacobian	12.8
1	Review of Chapter 12	
1	Exam #3	
1	Vector Fields; Divergence and Curl	13.1
2	Line Integrals	13.2
2	The Fundamental Theorem and Path Independence	13.3
2	Green's Theorem	13.4
2	Surface Integrals	13.5
2	Stokes' Theorem	13.6
1	Review of Chapter 13	
1	Exam #4	
2	Divergence Theorem	13.7
2	Review for the final	