

# MATH 565 - Differential Geometry

## Syllabus - Winter 2007

**Professor:** Michael Dorff  
**Office:** 281 TMCB  
**Office Phone:** 422-1752  
**Email:** mdorff@math.byu.edu  
**Office Hours:** MWF 1:00-1:30pm; TTh 2:00-2:30pm  
**Course Text:** *Differential Geometry of Curves and Surfaces* by DoCarmo  
**Reference Texts:** *Differential Geometry and Its Applications* by Oprea  
[a basic text with examples]  
*Elements of Differential Geometry* by Millman and Parker  
[more computationally oriented]  
*A Comprehensive Introduction to Differential Geometry, vols 1-5* by Spivak  
[a thorough discussion of differential geometry]  
*An Introduction to Differentiable Manifolds and Riemannian Geometry* by Boothby  
*Riemannian Geometry* by DoCarmo  
[a more advanced text]  
**Course Meeting:** MWF 10:00-10:50 am in 133 TMCB

**Course Description:** Math 565 is a beginning graduate course in the study of the differential geometry. Basically, differential geometry is the study of geometric objects using calculus. In this course, we will mostly study two-dimensional surfaces in  $\mathbb{R}^3$  although we will begin with some discussion of one-dimensional curves in  $\mathbb{R}^3$ . In a more general setting the ideas we discuss can be generalized to geometric objects in  $\mathbb{R}^n$ . During the course, we will consider both local properties (i.e., properties that depend only on the behavior of the curve or surface in a neighborhood of a point) and global properties (i.e., properties that are valid for the entire curve or surface). Also, we will consider extrinsic perspectives (i.e., looking at a lower-dimensional geometric object lying in a higher-dimensional space and thus allowing us to use properties of the space) and intrinsic perspectives (i.e., looking at the geometric object by itself without reference to any outside space in which it may lie).

**Course Objectives:** The course objectives are:

1. to increase students' understanding and appreciation of differential geometry, and its connection and significance to other areas of mathematics; and
2. to improve students' ability to read, write, and communicate about mathematical concepts and proofs.

**Expectations:** Success in this class will depend largely on the work you do outside of class. I expect and encourage you to ask lots of questions and to visit me during my office hours.

**Homework:** Homework will be assigned every class meeting and will be due the next class meeting. Homework problems will consist of problems from the course text and from which

will be distributed in class I encourage you to work with other students in the class by discussing the problems. However, the assignment that you hand in must be your own work.

**Student Presentations:** Part of the course and your grade will consist of in-class student presentation of homework problems or of lecture material. Usually, several students will be asked to present solutions to specific problems from that night's homework during the next class. Occasionally, a student will be asked to present a proof or a concept from the text during an upcoming class period.

**Tests:** There will be a takehome midterm and a takehome final exam. The dates for these will be determined later.

**Grading:** Final grades will be determined by weighted scaling of the following items: (a) homework scores; (b) number and correctness of exercises presented in class; (c) midterm score; and (d) final exam.

The class has determined the weighted scale to be:

$$30\% \cdot (a) + 30\% \cdot (b) + 20\% \cdot (c) + 20\% \cdot (d)$$

Letter grades will be assigned as follows:

B+	= 89-87%	C+	= 79-77%	D+	= 69-67%				
A	= 100-93%	B	= 86-83%	C	= 76-73%	D	= 66-63%	E	= 59-0%.
A-	= 92-90%	B-	= 82-80%	C-	= 72-70%	D-	= 62-60%		

#### **Miscellaneous:**

**Preventing Sexual Harassment:** BYU's policy against sexual harassment extends not only to employees of the university but to students as well. If you encounter sexual harassment, gender-based discrimination, or other inappropriate behavior, please talk to your professor, contact the Equal Employment Office at 378-5895, or contact the Honor Code Office at 378-2847.

**Students with Disabilities:** BYU is committed to providing reasonable accommodation to qualified persons with disabilities. If you have any disability that may adversely affect your success in this course, please contact the Services for Students with Disabilities Office at 378-2767. Services deemed appropriate will be coordinated with the student and instructor by that office.