Math 433 - Introduction to Differential Geometry

Fall 2011

Time and Place: MoWeFr 11:10 am - 12:00 pm in 1068 East Hall
Text: R. Millman and G. Parker, *Elements of Differential Geometry*, Prentice-Hall, 1977.
Instructor: Pat Boland
Office Hours: TBD
in 4843 East Hall
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Course Overview: This course is about the analysis of curves and surfaces in two and three dimensional space using the tools of calculus and linear algebra. There will be many examples discussed, including some which arise in engineering and physics applications. Emphasis will be placed on developing intuitions and learning to use calculations to verify and prove theorems. Students need a good background in multivariable calculus (215) and linear algebra (preferably 217). Some exposure to differential equations (216 or 316) is helpful but not absolutely necessary.

Content: The primary goal is to cover chapters 2, 4, and 7 of the text. The students will be responsible to study material in sections 2.6 and 4.11 (as these will not be covered in class). At the end of chapter 4, we will discuss the Euler characteristic of a surface and theorems 5.5 and 7.6 in chapter 6. We quickly review Chapter 1 material in the first two classes.

Grading Scheme: Five factors contribute to your final grade.

Assignment	% **of Final Grade**
Homework	30
Exam 1	15
Exam 2	15
Final Exam	25
Journal	15

Homework: There are approximately ten homework assignments. Each will consist of between nine and twelve problems. They will be available on CTools.

Exams: There are three exams.
Exam 1: Monday, October 10^{th} (in class)
Exam 2: Monday, November 21^{st} (in class)
Final Exam: Monday, December 19^{th}, 1:30 pm - 3:30 pm

Journal: Throughout the course you will keep a math journal. This is a notebook separate from your course notebook. The idea is be become aquainted

with certain curves and surfaces on a personal level. You will submit the journal at the beginning of the three exams. You will earn up to five points on each submission.

Expectations

1. The first part of your journal will be a "Dictionary of Terms" section. This will include a formal definition of the terms introduced in the text. To accompany each definition, you will choose an example (and usually perform a short computation) that brings the definition to life.

2. The second part of the journal will be a "List of Theorems" section. You will rewrite any lemma, proposition, and theorem from the text that we cover in class. You then "prove the theorem" for a well-choosen example. The idea is that most theorems are originally understood for particular examples and eventually proved in general using the same tools needed for proof of a nontrivial example.

3. The last (optional) part of the journal will be a "Questions and Related Topics" section. The honest study of any topic usually results in thousands of questions. You are strongly encouraged to write down questions, perform calculations on particular examples to test your questions, and summarize your findings in a sentence or two. In this section, you are also encouraged to use examples to understand definitions, theorems, and concepts in other related areas (eg. physics, engineering, architecture).

Important Dates:
First Class: Wednesday, September 7^{th}
Add/Drop Deadline: Monday, September 26^{th}
No Class: Monday, October 17^{th} and Friday, November 25^{th}
Last Class: Monday, December 12^{th}

Please inform me immediately if you have the right to special accomodations for exams, whether it be for athletic, extracurricular, religious, or personal reasons. I will need documentation.