Math 462- Elementary Differential Geometry
Fall 2011 - Syllabus

Faculty: Ralph Kaufmann

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Class times: MWF 10:30 – 11:20 am in REC 114
Homepage for the course: http://www.math.purdue.edu/~rkaufman/MA462f11/
Office hours: Monday and Wednesday 1:30 – 2:20 am.
If you have a conflict with these times, we can arrange for another time to meet.

Textbook: Manfredo P. Docarmo, *Differential Geometry of Curves and Surfaces*.

Course description: The basic idea and of differential geometry is to say something about the geometry of an object by moving a little bit on this object - for instance moving along a curve or on a surface. Turning this approach into a questions it reads: what kind of information can I get about my curve or my surface if I move a little bit on them? It turns out that there is indeed a lot one can learn. For a curve, one gets tangent directions, curvature and other geometric information in this way. For a surface, there are 2-d generalizations of these concepts.

One striking fact is that knowing this information everywhere allows you for instance to discover that the earth is not flat. Furthermore it allows one to explain why there cannot be any maps of the earth, which give the right distances and angles at the same time. These types of considerations are also the basis for the theory of general relativity.

In this course, we will treat curves and surfaces from the above perspectives, which lead us to the results discussed above. We will provide a classical treatment, but the results and concepts have applications in discretized versions for computer imaging and methods of finite elements.

Work philosophy: Since this is an advanced course a large emphasis will be on your activity in class and your working on the homework problems. The exams will be designed to be concept checks.

Final Exam: according to the official exam schedule.

Midterms: There will be one midterm, which will be in class. It is scheduled for Oct 19.

Homework: The homework will be posted on the class webpage. It is an essential part of the grade.