Prologue
I started on the path of understanding basic differential geometry because I didn't understand it when I had a course in graduate school.

Stumbles
So, I went hunting the demons of my youth in standard references such as Spivak, Singer & Thorpe, and others. In some cases I was overwhelmed by the avalanche of information or couldn't find the vision within elegant and efficient math presentations. In other cases, there were beautiful graphics where I didn't understand the underlying math. Everyone learns differently and I have strung together a path that I understand well enough to walk.

Confluences
One of the problems with understanding differential geometry is that it represents a confluence of ideas from different sources. This is expressed in the cover picture on Spivak's second volume. It shows albatrosses hanging from Spivak's neck

Path
My intent is to present differential geometry in a way that could be followed by a good third year university student who has studied linear algebra and vector calculus. This will be of interest to students who want to do surface or solid modeling. My presentation of differential forms is mostly guided by Spivak's "Calculus on manifolds". I have omitted most of the proofs and am lax in my notation, precise conditions and definitions in order to concentrate on the direction of thought. However, I hope to leave you with the impression that there is a logical path through the string of topics and all the statements can be easily proved.

Reading
The material has been divided into four-page sections that can usually be presented as one-hour lectures. The sections are not stand-alone and should be read in order. In its present form, the material is suitable as lecture notes, but is too dense to read if you are not already familiar with the material. If you are new to the subject, allow at least a day to read each section, and take time to think of your own examples. In spite of my initial difficulties, I hope you will find this subject beautifully simple and useful.

Mile Posts

The purpose of this material is to explain the following concepts:

- Manifolds
- Tensors
- Differential Forms
- Geodesics
- Covariant Derivative
- Stokes Theorem
- Curvature
- General Relativity