Textbooks on differential topology

Here is a list of some best-known textbooks on differential topology. The list is far from complete and consists mostly of books I pulled off of my shelf, but it will give you an idea. In a sense, there is no "perfect" book, but they all have their virtues.

1. *Milnor: Topology from a differentiable viewpoint, Virginia Univ. Press 1965.* This was the first book on the subject (I believe), based on Milnor's course notes at Princeton. It has been reprinted several times, but chances are, it's out of print. John Milnor is a famous topologist, who received a Fields Medal for his construction of an exotic differentiable structure on the 7-sphere. In 2011 he received the Abel Prize. The book is short and sweet and is highly recommended. Milnor is well-known for his expository skills and any book by him is a gem. Particularly noteworthy and relevant for smooth topology are his books on Characteristic Classes and on Morse Theory.

2. *Guillemin-Pollack: Differential Topology, Prentice Hall 1974.* This is the "official" textbook for the course. It was written under the obvious influence of Milnor's book, but contains additional topics. Perhaps the biggest drawback is that all manifolds are subsets of Euclidean space (while this is not so in real life). However, just like Milnor's book, I find reading it great fun.

3. *Hirsch: Differential Topology, Springer-Verlag 1976.* This is another classic. In addition to the usual topics, it has a nice discussion of vector bundles, tubular neighborhoods and Morse theory.

4. *Spivak: Differential Geometry I, Publish or Perish, 1970.* Part of a 5 volume set on differential geometry that is well-worth having on the shelf (and occasionally reading!). The first book is really about differential topology. We will use it for some of the topics such as the Frobenius theorem. The main drawback of this book is its length (>600 pages). However, a lot of topics are covered and they are well-explained, sometimes from several different points of view.

5. *Warner: Foundations of Differentiable Manifolds and Lie Groups, Springer-Verlag 1983.* A hands-on book focusing on Lie groups. Emphasis on local calculations.

6. *Bredon: Topology and Geometry, Springer-Verlag 1993.* Very concise, even terse in places.

7. *Lang: Differential Manifolds, Springer-Verlag 1985.* Perhaps too formal for an introductory text, but it is a great reference that contains some results hard to find elsewhere (e.g. smooth dependence of integral curves on parameters).

My plan is to stick to Guillemin-Pollack for the most part, with the major exception being the definition of a manifold. With luck we'll be done with Guillemin-Pollack in about 10 weeks or so, and the rest of the semester we'll look at some topics from Spivak.