Math 549 **Geometric Structures** **Spring 2008**

REFERENCES

The following books are (or soon will be) on 3-day reserve in the Math Research Library.

1. G. Folland, *Introduction to Partial Differential Equations*, Second edition, Princeton University Press, Princeton, 1995. An excellent general introduction to PDE theory. There's a review of preliminaries from real analysis in Chapter 1, and then most of the elliptic PDE theory we need is covered in Chapter 6.

2. G. Folland, *Real Analysis: Modern techniques and their applications*, Second edition, John Wiley & Sons, New York, 1999. A good background reference for Lebesgue integration, Hilbert spaces, distributions, and the Fourier transform.

3. S. Kobayashi and K. Nomizu, *Foundations of Differential Geometry*, New York, Interscience Publishers, 1969. This is a fairly comprehensive reference for differential geometry, with a strong emphasis on the principal bundle approach, and a thorough treatment of connections and characteristic classes. It's hard to read if you don't already have a basic understanding of the material, but it's a good reference.

4. H. B. Lawson and M.-L. Michelsohn, *Spin geometry*, Princeton, Princeton University Press, 1989. A comprehensive introduction to spin algebra, spin bundles, Dirac operators, and their applications in geometry and topology.

5. J. Lee, *Introduction to Topological Manifolds*, Springer-Verlag, New York, 2000. The library also has a copy of the draft second edition, 2007.

6. J. Lee, *Introduction to Smooth Manifolds*, Springer-Verlag, New York, 2003. The library also has a copy of the draft second edition, 2007.

7. J. Lee, *Riemannian Manifolds: An Introduction to Curvature*, Springer-Verlag, New York, 1997.

8. J. W. Milnor and J. D. Stasheff, *Characteristic classes*, Princeton, Princeton University Press, 1974. This is the standard reference for the topological construction of characteristic classes. It also has an appendix explaining the Chern/Weil construction of characteristic classes using connections.

9. M. Spivak, *A comprehensive introduction to differential geometry*, Berkeley, Publish or Perish, 1979. This is a classic. It's overly verbose, and not as complete as one might like, but many people find it fun to read. The basic theory of vector bundles is laid out in Volume 1, principal bundles and connections are treated in various ways in Volume 2, and characteristic classes are treated in Volume 5.

10. F. Warner, *Foundations of Differentiable Manifolds and Lie Groups*, Springer-Verlag, 1983. This is a general introduction to differential geometry. For our purposes, it is useful because it has a self-contained proof of the Hodge Theorem in Chapter 6. Be warned, however, that Warner's proof is quite unconventional in that the analytic results are reduced to the case of operators on a Euclidean torus, where the theory of Fourier series can be applied. This approach, although more elementary than the one we will use, is much less general and less in the spirit of modern geometric analysis.