Applications of Differential Geometry to Physics

Some Textbooks

In preparing the course I have used among others:

1 Y Choquet Bruhat, C DeWitt-Morette & M Dilliard Bleick *Analysis Manifolds and Physics*, North Holland
2 H Flanders *Differential Forms*, Dover
3 B O'Neil *Semi-Riemannian Geometry*, Academic Press
4 B Dubrovin, S Novikov & A Fomenko *Modern Geometry*, Springer
5 T Eguchi, P Gilkey and A J Hanson *Physics Reports* **66** (1980) 213-393
6 V Arnold *Mathematical Methods of Classical Mechanics*, Springer
7 N M J Woodhouse *Geometric Quantization*, Oxford

This list does not exhaust the set of good textbooks on this subject at the level at which it will be lectured. In particular many speak highly of

8 C Nash and S Sen *Topology and Geometry for physicists* Academic Press
9 M Nakahara, *Geometry, Topology and Physics* Institute of Physics
10 R Darling *Differential Forms and Connections* Cambridge University Press
11 T Fraenkel *The Geometry of Physics* Cambridge University Pres

There is a great deal of relevant material on particular topics in

12 J Marsden and R Ratiu, *Introduction to Mechanics and Symmetry*
13 R Gilmore *Lie Algebra Lie Groups and some of their Applications*
14 R Aldrovandi and J G Perira *An Introduction to Geometrical Physics* World Scientific
15 B Felsager *Geometry Particles and Physics*
16 C J Isham *Modern Differential Geometry for Physicists* World Scientific
17 V Guillemin and S Sternberg *Symplectic Techniques in Physics* Cambridge University Press
18 R Abraham and J Marsden *Foundations of Mechanics*
19 A S Schwarz *Topology for Physicists* Springer
20 A Visconti *Introductory Differential Geometry for Physicists*

Perhaps the best book covering almost all the course is probably number 1 or number 4. I found 2 extremely useful for a first look at differential forms. Finally much information and many relevant examples are contained in

21 C Misner, K Thorne and J Wheeler, *Gravitation* Freeman