A Course in Modern Mathematical Physics: Groups, Hilbert Space and Differential Geometry, *P. Szekeres*, Cambridge University Press, 2004, pp: 600, ISBN 0521829607 (hc); Price: US$65.

This a rather lengthy, detailed textbook covering topics ranging from the basics of set theory, through groups and topology, to differential geometry and Lie groups. The length is not detrimental, though: the author manages to keep a good balance between depth and breadth of the topics covered . The book is well written and well organized, and since it includes numerous examples from physics, it is distinct from textbooks of pure mathematics. In my opinion, Szekeres' book can serve well either as a stand-alone textbook for a senior undergraduate or graduate course in mathematical physics, or as a reference book for the active theoretical physicist.

A Course in Modern Mathematical Physics is divided into 19 chapters. Chapters 1-3 are introductory — they introduce foundations of the theory of sets, groups and vector spaces, and can be safely skipped by a reader with sufficient background in these areas. Chapters 4 to 8 build on these foundations by introducing linear operators and then moving on to inner products, algebras, and finally to tensors and exterior algebras. Chapter 9 is a first of several excursions into physics, in this case to special relativity. Chapters 10-12 introduce topology, measures, and distributions; Chapter 13 then brings in Hilbert spaces. Chapter 14 presents application to quantum mechanics. Coverage of differential geometry begins with Chapter 15 which introduces manifolds, differentiable maps and Lie derivatives. Chapter 16 covers differential forms and presents examples from thermodynamics and mechanics. Chapter 17 continues with integration on manifolds and culminates in the Stokes theorem and the Poincaré lemma. Chapter 18 presents Riemannian manifolds and connections, and their application to general relativity. Chapter 19 introduces Lie groups. In my opinion, the latter deserves a little more room, considering the wide range of applications of Lie groups and algebras in stability theory and in Hamiltonian mechanics.

As the author stresses in the foreword, this book is rather mathematical, presenting topics from the point of view of mathematical (as opposed to theoretical) physics. The potential reader should have a relatively solid foundation in advanced calculus including multivariable calculus and multiple integration. The book is not easy reading and I would not recommend it to people with a less-than-positive attitude towards math. On the other hand, it is definitely great reading for mathematically inclined physicists.

The book includes a number of solved problems, making it suitable for self-study, and unsolved examples that provide a good basis for assignments and exams.

Overall, this book is a solid textbook for senior undergraduate and graduate courses — maybe on the more difficult side, considering the topics covered. Alternatively, it is a good reference book for active physicists who might need a little refreshing in these areas.

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