SOME RELEVANT AND NOT-SO-RELEVANT TEXTS

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This is a sampling of some texts in subjects more-or-less related to the courses I usually teach, limited to books that I happen to know and/or like.

1. Hilbert Space Theory

(1) L. Debnath and P. Mikusiński, *Introduction to Hilbert Spaces with Applications*, Second Edition, Academic Press, 1999. This is the Hilbert space book I usually use as a textbook. It is fairly decently written but has occasional annoying lapses.

(2) I. Gohberg and S. Goldberg, *Basic Operator Theory*, Birkhäuser, 2001 (reprint of the 1981 original). A nice, easy-to-read introduction to Hilbert space theory. The typeface is not very stylish, but don't hold that against it.

(3) E. Kreyszig, *Introductory Functional Analysis with Applications*, Wiley, 1978. Very nicely written, includes a lot of Banach space stuff in addition to Hilbert spaces, which makes it a little difficult to use as a textbook but by the same token makes it an excellent supplement and reference.

(4) R. Young, *An Introduction to Nonharmonic Fourier Series*, Academic Press, 1980. The motivation for this book is Fourier series, not Hilbert spaces, so it should really go under the Harmonic Analysis section. However, it is a very readable book, with lots of good information on bases and frames in Hilbert spaces, so it's worth keeping in mind as a Hilbert space reference.

2. Linear Algebra

(1) G. Strang, *Introduction to Linear Algebra*, Wellesley–Cambridge Press, 1993. Lots of good, easy-to-read information on finite-dimensional matrix theory. Gets you beyond mere mechanics of matrix operations.

(2) R. A. Horn and C. R. Johnson, *Matrix Analysis*, Cambridge, 1985. Lots and lots of information, but reasonably accessible and concrete, concentrating on matrices rather than abstract vector spaces.

(3) K. Hoffman and R. Kunze, *Linear Algebra*, Prentice–Hall, 1971. This is a "classic" text on linear algebra from the abstract viewpoint. It's quite abstract, contains more than you're ever likely to want to know about linear algebra, and still is fairly readable, if you're comfortable with the abstraction.

3. Undergraduate Real Analysis

(1) R. Bartle, *The Elements of Real Analysis*, Wiley, 1964. This is the text used here at Georgia Tech for undergraduate analysis.

(2) W. Rudin, *Principles of Mathematical Analysis*, McGraw–Hill, 1964. Affectionately referred to as "baby Rudin" (to distinguish it from "big Rudin," listed in the next section). A tad bit old, but I like it.

(3) M. Stoll, *Introduction to Real Analysis*, second edition, Addison-Wesley, 2001. Nicely written but only does analysis on $\mathbf{R}$, not on $\mathbf{R}^n$.

4. Graduate Real Analysis

(1) R. Wheeden and A. Zygmund, *Measure and Integral*, Marcel Dekker, 1977. This is the book I learned real analysis from, so of course I like it. All the information you need to know, presented in $\mathbf{R}^n$ first, with the generalization to measure spaces later, so you can actually use your intuition for Euclidean spaces before making the jump to abstract spaces. It does lack any discussion of functional analytic topics like the Hahn–Banach theorem, but you can get that elsewhere.

(2) H. L. Royden, *Real Analysis*, 3rd edition, Macmillan, 1988. This is one of the "classic" graduate texts in real analysis. Fairly readable, although I don't always like its organization or choice of content.

(3) W. Rudin, *Real and Complex Analysis*, 3rd edition, McGraw–Hill, 1987. Fairly abstract, but well-written. A great reference book once you know a little real analysis.

(4) G. Folland, *Real Analysis*, Second Edition, Wiley, 1999. A little dense, but again one of those books that is an extremely useful reference. Also contains a good bit of functional and Fourier analysis.

5. Functional Analysis

Functional analysis is basically an outgrowth/combination/extension of Hilbert space and real analysis. So these texts are generally more difficult, concentrating on Banach spaces instead of Hilbert spaces, but contain good information.

(1) E. Kreyszig, *Introductory Functional Analysis with Applications*, Wiley, 1978. This was listed in the Hilbert space section but it is mostly a book on Banach spaces and functional analysis. Nicely written, but the exercises tend to be a little too easy.

(2) A. W. Naylor and G. R. Sell, *Linear Operator Theory in Engineering and Science*, Springer, 1982. Covers a lot of material, pretty well-written.

(3) J. B. Conway, *A Course in Functional Analysis*, 2nd edition, Springer–Verlag, 1990. Higher-level, and a little dense.

6. Harmonic Analysis

Harmonic analysis and wavelet theory are my own research areas.

(1) J. Benedetto, *Harmonic Analysis and Applications*, CRC Press, 1997. Written by my advisor. A bit idiosyncratic and a little dense, but I like it and haved used it as a text for Harmonic Analysis.

(2) Y. Katznelson, *An Introduction to Harmonic Analysis*, 3rd edition, Cambridge University Press, 2004. This is a classic text (and it is available in paperback). Although somewhat dense, it contains a wealth of material on both Fourier series and Fourier transforms.

(3) H. Dym and H. P. McKean, *Fourier Series and Integrals*, Academic Press, New York, 1972. This is a very charming book, which contains a number of applications as well as the basic theory of Fourier series and the Fourier transform. It is an excellent introduction to the field but also contains a great deal of deeper and interesting material.

(4) T. W. Körner, *Fourier Analysis*, Cambridge, 1988. An entertaining book, with lots of very short chapters each on a different aspect of Fourier analysis.

(5) K. Gröchenig, *Foundations of Time-Frequency Analysis*, Birkhäuser, 2001. Written by one of my coauthors, it is beautiful introduction to the field of time-frequency analysis, which could also be called "local Fourier analysis."

7. Wavelets

(1) I. Daubechies, *Ten Lectures on Wavelets*, SIAM, 1992. If you've got some background in real analysis, then this is a terrific book. Not only does it do the mathematics of all kinds of wavelets, but it points out the connections to other fields. It doesn't do applications, but it gives you a sense of how the connections arise.

(2) Y. Meyer, *Wavelets: Algorithms and Applications*, SIAM, 1993. An entertaining survey of wavelet theory with little mathematics.

(3) G. Strang and T. Nguyen, *Wavelets and Filter Banks*, Wellesley–Cambridge Press, 1995. Written by a mathematician and an engineer; presents the mathematics but using filter bank language.