References

The following is a selection of books, arranged in categories and with brief annotations, to use during a course where DAM is the text or after such a course.

1. Discrete Mathematics Books Accessible to most First- and Second-Year Students

There are now a great many discrete math books on the market. Those below suggest some of the different flavors.

Dossey, John A., Otto, Albert D., Pence, Lawrence E. and Vanden Eynden, Charles. 2002. *Discrete Mathematics* 4/e, Addison-Wesley.

Fairly elementary approach, with a very good range of applications, intended to interest a broad audience, including future teachers.

Epp, Susanna S. 2004. *Discrete Mathematics with Applications*, 3/e, Brooks Cole.

Well-written with especially extensive and effective material for improving reasoning skills.

Johnsonbaugh, Richard. 2005. *Discrete Mathematics*, 6/e, Prentice Hall.

Perhaps the text closest to DAM in the emphasis on algorithmics.

Rosen, Kenneth H. 2003. *Discrete Mathematics and its Applications*, 5/e, McGraw-Hill.

Comprehensive and readily available.

2. More Advanced Discrete Math Books

The next books are either for a second discrete math course, or for a first course taught at the junior-senior level.

Biggs, Norman L. 2003. *Discrete Mathematics*, 2/e, Oxford University Press.

Terse but clear, covering many more topics than DAM, including much more number theory and algebra.

Grimaldi, Ralph P. 1998. *Discrete and Combinatorial Mathematics: An Applied Introduction*, 4/e, Addison-Wesley.

Starts at the beginning, but covers many more topics than DAM, especially algebraic topics (e.g., Polya theory, finite state machines, finite fields and codes).

Roberts, Fred. 1984 *Applied Combinatorics*, Prentice Hall.

Fairly general discrete math coverage, but especially broad in combinatorics (more than DAM). Many examples in biology and social sciences.

Books on individual topics

3. Algorithms

Aho, Alfred V., Hopcroft, John E., and Ullman, Jeffrey D. 1974. *The Design and Analysis of Computer Algorithms*, Addison-Wesley.

A classic; terse, but covers a lot of ground, and everyone refers to it.

Cormen, Thomas H., Leiserson, Charles E., and Rivest, Ronald L. 2001. *Introduction to Algorithms*, 2/e, McGraw-Hill.

A popular, comprehensive general computer science text on algorithms, e.g., programming, data structures, important specific algorithms, as well as the mathematics of them.

Greene, Daniel H. and Knuth, Donald E. 1990. *Mathematics for the Analysis of Algorithms*, 3/e, Birkhauser.

Worked up from lecture notes on a course Knuth gave specifically to flesh out carefully the mathematics of algorithm analysis.

Horowitz, Ellis, Sahni, Sartaj, and Rajasekaran, Sanguthevar. 1997. *Computer Algorithms*, Computer Science Press.

Similar to the book by Cormen above, but perhaps a bit easier. Comes in both pseudocode and C++ versions.

Sedgewick, Robert, and Flajolet, Philippe. 1995. *An Introduction to the Analysis of Algorithms*, Addison-Wesley.

Special attention to average-case analysis and to algorithms of particular interest in computer science.

Wilf, Herbert S., 2002. *Algorithms and complexity*, 2/e, A K Peters.

Emphasizes problems of mathematical interest: algorithms in number theory (including public key encription), Fast Fourier Transform, network flows.

4. Induction

There are few books exclusively on mathematical induction; instead there is usually a section or chapter on induction in more general math books. Here are the books we know.

Golovina, L. I., and Yaglom, I. M. 1963. *Induction in Geometry*, D. C. Heath.

While geometry is not really a discrete math topic, there are lovely and surprising uses of induction in this pamphlet.

Youse, Bevan K. 1964. *Mathematical induction* Prentice Hall.

This book (and the next) are mostly about traditional uses of induction (e.g., formulas for sums – no algorithms).

Sominskii, I. S. 1961. *The Method of Mathematical Induction*, Pergamon Press.

5. Graph Theory

Wilson, Robin J. 1996. *Introduction to Graph Theory*, 4/e, Longman.

A relatively short book for this subject, well written and excellent for self-study.

Bondy, J. Adrian, and Murty, U.S.R. 1976. *Graph Theory with Applications*, American Elsevier.

Considered a classic because of its elegant proofs and broad coverage for a thin volume.

Gross, Jonathan, and Yellen, Jay. 1998. *Graph Theory and its Applications*, CRC Press.

Comprehensive, with strong emphasis on computer science and operations research applications and algorithms.

West, Douglas B. 2001. *Introduction to Graph Theory* 2/e, Prentice Hall.

A more traditional approach (more structure theory, less algorithms) with broad coverage and many challenging problems.

6. Counting (Combinatorics)

Graham, Ronald L., Knuth, Donald E., and Patashnik, Oren. 1994. *Concrete Mathematics*, 2/e, Addison-Wesley.

Treats, in a unique style, advanced methods to solve problems of particular interest in computer science. While it combines CONtinuous and disCRETE mathematics, in fact it has very much the flavor of discrete mathematics.

Stanley, Richard P. 2000. *Enumerative Combinatorics*, Vol. 1, Cambridge University Press.

A standard advanced text by a leading researcher.

Stanton, Dennis, and White, Dennis. 1986. *Constructive Combinatorics*, Springer-Verlag, New York.

Combinatorics with a distinctly modern, algorithmic flavor. Like DAM, it uses algorithms to generate both theorems and their proofs.

Petkovšek, Marko, Wilf, Herbert S., and Zeilberger, Doron. 1996. $A = B$, A K Peters.

A very readable exposition of ground-breaking research on the automation of the discovery (or proof of non-existence) of combinatorial identities.

Wilf, Herbert S. 1994. *Generatingfunctionology*, 2/e, Academic Press.

A very thorough and lively treatment of the generating function approach to counting.

7. Difference Equations

Goldberg, Samuel I. 1986. *Introduction to Difference Equations*, Dover.

A classic, (originally published 1958) with a leisurely development of the theory. Contains many social science examples, and introduced many social scientists to the subject.

Mickens, Ronald E. 1991. *Difference Equations: Theory and Applications*, 2/e, CRC Press.

A more advanced work.

8. Probability

Devore, Jay L. 2003 *Probability and Statistics for Engineering and the Sciences*, 6/e, Duxbury Press.

Well written, assumes modest calculus, and covers substantial amounts of both probability and statistics.

Feller, William. 1968. *An Introduction to Probability Theory and Its Applications*, Vols. 1 and 2, 3/e, Wiley.

A classic. Wonderful examples. The first volume is mainly about discrete probability.

Grinstead, Charles M., and Snell, Laurie J. 1997. *Introduction to Probability*, 2/e, American Mathematical Society.

Introductory text that treats discrete and continuous in parallel and provides many computer programs for computation, simulation, and development of intuition.

9. Logic

Bergmann, Merrie, Moor, James, and Nelson, Jack. 2003. *The Logic Book*, 4/e, McGraw-Hill.

Popular general symbolic logic text, often used by philosophy departments.

Quine, Willard V. 1989. *Methods of Logic*, 4/e, Harvard University Press.

A classic by a leading logician.

Schagrin, Morton L., Rapaport, William J., and Dipert, Randall R. 1985. *Logic: A Computer Approach*, McGraw-Hill.

A fairly low-level book and one of the few books on logic aimed at computer scientists.

10. Discrete Math and Biology

Gusfield, Dan. 1997. *Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology*, Cambridge University Press.

A very thorough and current presentation by a computer scientist who got interested in computational biology.

11. Matching Algorithms

Almost any book on linear programming, linear optimization, or combinatorics will contain the basic matching results, and most will contain algorithmic proofs. But here is an advanced book devoted entirely to this subject.

Lovász, L., and Plummer, M.D. 1986. *Matching theory*, North-Holland.

12. Other Useful Books

Pemmaraju, Sriram, and Skiena, Steven S. 2003. *Computational Discrete Mathematics: Combinatorics and Graph Theory with Mathematica*, Cambridge University Press.

A guidebook to *Combinatorica*, probably the most powerful general discrete math software available currently – it's an add-on to the CAS *Mathematica*.

Polya, George. 1971. *How to Solve it*, Reissue edition, Princeton University Press.

Polya's books, especially this one, are *the* source on developing mathematical problem-solving skills.

Roberts, Eric S., 1986. *Thinking Recursively*, Wiley.

A charming introduction to the beauty and power of the Recursive Paradigm. Many unusual examples.

Rosen, Kenneth H., ed. 1999. *Handbook of Discrete and Combinatorial Mathematics*, CRC Press.

A very general quick reference – definitions, theorem statements, references, but no proofs – with brief presentations on just about every discrete topic.

Solow, Daniel. 2002. *How to Read and Do Proofs: an Introduction to Mathematical Thought Processes*, 3/e, Wiley, New York.

A very thorough and readable short book, made even more accessible because for examples it uses mostly high school mathematics.