REFERENCES FOR
ENEE 722 ERROR CORRECTING CODES

1. Anderson, John B., and Seshadri Mohan, *Source and Channel Coding*, Kluwer Academic Publishers, 1991. (Detailed treatment of decoding of trellis codes with architectures for implementing Viterbi and sequential decoders. Considers source coding as well as channel coding. Presentation tends to be verbal rather than analytical and the book tends to be more of a survey rather than an indepth treatment.)

2. Anderson, John B., and Arne Svensson, *Coded Modulation Systems*, Kluwer Academic/Plenum Publishers, 2003. (Discusses trellis codes for AWGN and fading channels. Sections on continuous phase modulation are included. The book is more like a survey with little depth in many places.)

3. Arazi, Benjamin, *A Common Sense Approach to the Theory of Error Correcting Codes*, MIT Press, 1988. (A poor presentation.)

4. Berlekamp, E.R., *Algebraic Coding Theory*, McGraw-Hill, New York, 1968. (A classic text on algebraic cyclic codes. Advanced presentation. Won an IEEE Information Society award for outstanding paper.)

5. Berlekamp, E.R., (Ed.), *Key Papers in the Development of Coding Theory*, IEEE Press, 1974. (A collection of classic papers on error correcting codes.)

6. Biglieri, Ezio, Pariush Divsalar, Peter J. McLane, Marvin K. Simon, *Introduction to Trellis-Coded Modulation with Applications*, Macmillan, 1991. (The first textbook completely on trellis coding. A reasonably clear presentation. Includes trellis codes for fading channels and partial response channels.)

7. Blahut, Richard E., *Theory and Practice of Error Control Codes*, Addison-Wesley, 1983. (A good modern presentation of algebraic cyclic coding theory. Emphasiszes a frequency domain approach.)

8. Blahut, Richard E., *Algegraic Codes for Data Transmission*, Cambridge University Press, 2003. (A revision of his 1983 book. Includes new material on turbo codes. Has a brief survey chapter on iterative decoding for codes described on graphs which is too condensed to be of much use.)

9. Blake, I.F. and R.C. Mullin, *The Mathematical Theory of Coding*, Academic Press, New York, 1975. (Deals with combinatorial aspects of coding.)

10. Clark, G.C. and J.B. Cain, *Error-Correction Coding for Digital Communications*, Plenum Press, 1981. (Good coverage and examples. Weak on theory.)

11. Fan, John L., *Contrained Coding and Soft Iterative Decoding*, Kluwer Academic Publisher, 2001. (An excellent presentation of probability message passing alogrithms for graphs leading to the sum-product algorithm for decoding LDPC codes using log-likelihood ratios. Presents codes for magnetic recording channels. Fan presents concepts very clearly and includes many helpful details in his proofs.)

12. Forney, G.D., *Concatenated Codes*, MIT Press, Cambridge, MA, 1967. (Forney's Ph.D. thesis)

13. Gallager, R.G., *Low-Density Parity Check Codes*, MIT Press, Cambridge, Massachusetts, 1963. (Basically Gallager's Ph.D. thesis. These codes have recently been re-discovered and are being studied extensively. They can have performance close to capacity with iterative soft-input/soft-output decoding.)

14. Gallager, R.G., *Information Theory and Reliable Communication*, John Wiley & Sons, New York, 1968, Chapter 6. (An excellent introduction to cyclic codes. Sequential decoding of convolutional codes also analyzed.)

15. Golomb, S.W., *Shift Register Sequences*, Holden-Day, San Francisco, 1967. (A detailed study of shift register sequences.)

16. Hagenauer, Joachim, Elke Offer, and Lutz Papke, "Iterative Decoding of Binary Block and Convolutional Codes," *IEEE Transactions on Information Theory*, Vol. 42, No. 2, March 1996, pp. 429–445.

17. Heegard, Chris and Stephen B. Wicker, *Turbo Coding*, Kluwer Academic Publishers, 1999. (It is not well written. The authors try to formalize and abstract things and "hide the trees in the forest." Auxiliary points are belabored while critical details are glossed over.)

18. Houghton, A.D., *The Engineer's Error Coding Handbook*, Chapman & Hall, 1997. (An elementary, empirical, disorganized, weak presentation.)

19. Huffman, W. Cary, and Vera Pless, *Fundamentals of Error-Correcting Codes*, Cambridge University Press, 2003. (A detailed presentation of the mathematical aspects of algebraic codes with a brief chapter on convolutional codes and probabilistic decoding. The subtle algebraic properties of many codes are presented but almost no discussion of the relative merits of the codes is presented. This book will not be much help to engineers interested in implementing practical coded systems.)

20. Johannesson, Rolf and Kamil Sh. Zigangirov, *Fundamentals of Convolutional Coding*, IEEE Press, 1999. (A very indepth treatment of binary convolutional codes. It includes a detailed presentation on the algebraic structure of convolutional codes; list decoding; sequential decoding by the stack, Fano, and creeper algorithms; iterative decoding; and trellis coding. Much of the material cannot be found in any other textbook.)

21. Lin, S., *An Introduction to Error Correcting Codes*, Prentice-Hall, 1970. (An introduction to binary cyclic and convolutional codes with examples.)

22. Lin, S. and D.J. Costello, *Error Control Coding*, Prentice-Hall, 1983. (A more complete presentation than in [Lin, 1970].)

23. Lucky, R.W., J. Salz, and E.J. Weldon, Jr., *Principles of Data Communication*, McGraw-Hill, 1968, Ch. 10-12. (A classic book on communications which emphasizes narrowband channels found in telephone systems. Ch. 10-12 survey error correcting codes.)

24. MacKay, David J.C., *Information Theory, Inference, and Learning Algorithms*, Cambridge University Press, 2003. (Sections of PDF preprint version on MacKay's web site. Full PDF file on /software/boolean. A nice readable introduction to LDPC codes and the sum-product algorithm.)

25. MacWilliams, F.J. and N.J.A. Sloane, *The Theory of Error Correcting Codes*, Elsevier/North Holland, 1979. (A detailed mathematical presentation for cyclic codes with emphasis on combinatorial aspects.)

26. Mann, *Error Correcting Codes*, Wiley, 1968. (A specialized collection of conference papers.)

27. Massey, J.L., *Threshold Decoding*, MIT Press, Cambridge, MA, 1963. (His PhD thesis.)

28. McEliece, Robert J., *The Theory of Information and Coding*, **Encyclopedia of Mathematics and It's Applications**, Vol. 3, Addison-Wesley, 1977.

29. McEliece, Robert J., *The Theory of Information and Coding*, **Encyclopedia of Mathematics and It's Applications**, Student Edition, Cambridge University Press, 2004. (About 1/2 on classical information theory and 1/2 on error correcting codes. More of a survey and often rather condensed. No mention of the modern coding techniques of turbo codes and low-density parity check (LDPC) codes.)

30. McEliece, Robert J., *Finite Fields for Computer Scientists and Engineers*, Kluwer Academic Publishers, 1987. (An excellent introduction to Galois fields. Discusses traces, dual bases and Berlekamp's bit serial multiplication method. Extensive discussion of PN sequences).

31. Michelson, A.M. and A.H. Levesque, *Error-Control Techniques for Digital Communications*, Wiley Interscience, 1985. (Good survey and examples. Light on theory.)

32. Morelos-Zaragoza, Robert H., *The Art of Error Correcting Codes*, J. Wiley & Sons, 2002. (A very nice survey of error correcting codes starting with classical block and convolutional codes up through recent interative decoding methods including turbo codes and low-density parity check codes. The author maintains a website of programs for ECC. Unfortunately, the book includes essentially no theory but just catalogs results. Therefore, no idea of how codes really work can be learned from it. An up-to-date list of references is included.)

33. Pearl, Judea, *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*, Morgan Kaufmann, 1988. (A detailed presentation of "belief propagation" in Bayesian networks. It is very well written with clear explanations and many examples. The *sum-product* algorithm for decoding low-density parity-check codes is a special case of belief propagation.)

34. Peterson, W.W., *Error Correcting Codes*, MIT Press, Cambridge, MA, 1961. (THE ORIGINAL BOOK ON CYCLIC ERROR CORRECTING CODES. A detailed but difficult to read presentation.)

35. Peterson, W.W. and E.J. Weldon, Jr., *Error Correcting Codes*, MIT Press, 1972. (An updated version of Peterson's 1961 book. One of the best references for cyclic codes even today.)

36. Pless, V., *Introduction to the Theory of Error-Correcting Codes*, Wiley-Interscience, 1982. (A short, elementary, mathematical introduction to cyclic codes.)

37. Pless, V., and W.C. Huffman, Eds., *Handbook of Coding Theory*, Elsevier, 1998.

38. Pless, Vera, and W. Cary Huffman, *Fundamentals of Error-Correcting Codes*, Cambridge University Press, 2003. (not reviewed yet)

39. Pretzel, Oliver, *Error-Correcting Codes and Finite Fields*, Oxford University Press, paperback 1996. (Only covers algebraic codes. Nothing on convolutional codes. A nice readable presentation of Galois fields.)

40. Proakis, J.G., *Digital Communications*, 2nd Ed., McGraw-Hill, 1989, Ch 5. (Survey of error correcting codes.)

41. Rao, T.R.N., and E. Fujiwara, *Error-Control Coding for Computer Systems*, Prentice Hall, 1989. (Focuses on codes for memories and logic circuits.)

42. Reed, Irving S. and Xuemin Chen, *Error-Control Coding for Data Networks*, Kluwer Academic Publishers, 1999. (A moderately in-depth and comprehensive coverage of error control codes. Of course, Reed-Solomon codes are extensively discussed. There are many any examples of applications in real-world systems. The presentations are often brief and more like a survery. Reference to more detailed treatments would be required to fully understand many topics.)

43. Schlegel, Christian, *Trellis Coding*, IEEE Press, 1997. (A modern and quite readable introduction to trellis codes. The first book to include a chapter on turbo codes.)

44. Schlegel, Christian B., and Lance C. Pérez, *Trellis and Turbo Coding*, IEEE Press, Wiley-Interscience, 2004. (A reasonably good and modern introduction to convolutional, trellis, LDPC, and turbo codes. Iterative decoding and factor graphs are discussed. The presentation is clear in some places but brief and not very understandable in others. There are lots of typos and some conceptual errors.)

45. Sloane, N.J.A., *A Short Course on Error Correcting Codes*, Springer-Verlag, NY., 1975.

46. Sweeney, Peter, *Error Control Coding, An Introduction*, Prentice-Hall, 1991. (Nice elementary introduction and suvery of field.)

47. Sweeney, Peter, *Error Control Coding, from Theory to Practice*, Wiley, 2002. (A very readable introduction and survey of the field. The depth of coverage for each topic is very shallow and the book will not be useful for really learning the art of error control coding.)

48. Steven A. Tretter, *Constellation Shaping, Nonlinear Precoding, and Trellis Coding for Voiceband Telephone Channel Modems with Emphasis on ITU-T Recommendation V.34*, Kluwer Academic Publishers, 2002.

49. Van Lint, J.H., *Coding Theory, Lecture Notes in Mathematics*, No. 201, Springer-Verlag, 1971.

50. Viterbi, A.J., and J.K. Omura, *Principles of Communication and Coding*, McGraw-Hill, 1979. (A clear, detailed presentation of convolutional codes and the Viterbi decoding algorithm.)

51. Vucetic, Branka, and Jinhong Yuan, *Turbo Codes, Principles and Applications*, Kluwer Academic Publishers, 2000. (A nicely written book that presents the theory and practice. Starting with Chapter 7 Interleavers, the presentation becomes much more descriptive and hand-waving which makes the presentation much less satisfying.)

52. Wells, Richard B., *Applied Coding and Information Theory for Engineers*, Prentice Hall, 1999. (A brief and elementary introduction to information theory and coding. Very little depth.)

53. Wicker, Stephen B., *Error Control Systems for Digital Communications and Storage*, Prentice-Hall, 1995. (Good presentation and coverage of modern error control methods with applications to compact disk systems and trellis coding.)

54. Wicker, Stephen B., and Saejoon Kim, *Fundamentals of Codes, Graphs, and Iterative Decoding*, Kluwer Academic Publishers, 2003. (Contains many recent research results. The book is not well written. It contains great detail about less important topics and leaves out significant steps in derivations of important results. There are many typo's and at least one figure that doesn't correspond to the text.)

55. Wilson, Stephen G., *Digital Modulation and Coding*, Prentice-Hall, 1996. (Covers information theory, detection, and cyclic and convolutional codes. Good survey but not a lot of depth.)

56. Wozencraft, J.M. and I.M. Jacobs, *Principles of Communication Engineering*, Wiley, New York, 1965. (Includes the first textbook presentation of sequential decoding of convolutional codes.)