RED BOOKS: (SEQUENCE ANALYSIS)

Baxevanis, A.D., and Ouellette, B.F.F. (eds) 2001. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. John Wiley & Sons, NY. (1X, red). This easy to read book designed for biologists, skips the math underlying most of the useful sequence analysis program, and just describes what YOU need to know, in order to use and appreciate what’s going on with sequence algorithms. From among chapters 8-11, (“Sequence Alignment and Database Searching, Practical Aspects of Multiple Sequence Alignment, Phylogenetic Analysis, Predictive Methods, Using Protein Sequences”) chose any 2 chapters and write a summary of the key ideas and parameters that influence the program outcomes.

Buchler, L. K. and Rashidi, H.H. 2005. Bioinformatics Basics: Applications in Biological Science and Medicine. CRC, Taylor & Frances (1x, red). While not exactly written at an introductory level, this book attempts to explain the best or most productive ways in which common bioinformatics tools can be used or adapted to meet the needs of researchers with different interests and projects. The overviews of different topics are terrific and they cover a lot of territory! From among chapters 2, 3 and 4 (Biological databases, Genome Analysis, Proteome Analysis), choose 1 chapter. Read and summarize the key ideas and parameters that can influence the results of an analysis.

Claverie, J-M., and Notredam, C. 2003. Bioinformatics for Dummies. Wiley Publishing Inc (1x, red). OK, so this one IS for the real novices! It is so "lite" one hesitates to put it on the reading list at all. Nonetheless, for REAL novices, this book can be a place to start. Of more practical importance, most of the chapters have a series of hands-on tutorials that lead you to a web site, then send you through multiple online point-click exercises. Read Part II or Part III (A Survival Guide to Bioinformatics, Becoming a Pro in Sequence Analysis). Actually DO an many of the exercises in your chosen chapters as is feasible. Your report should consist of tangible evidence that will convince ACP you have indeed done these exercises (and therefore learned something).


Higgs, G. and Attwood, T.K. 2007. Bioinformatics and Molecular Evolution. Blackwell Publishing (1X, red). This is another new book on the basics of sequence analysis. It might be a little too detailed for a real novice, but the it is comprehensive and up-to-date in the fundamentals. This is a book you might want to have on your desks for personal reference since it covers so many great topics. ALL the topics are useful! Read Chapter 1 (Intro) as an intro, then from among Chapters 6, 7, 8, 9, 10 and 13, choose 2 more chapters of interest to you or your personal bioinformatics interests. Ignore the math, except as it helps you understand what is being discussed, and write a brief summary of the key procedures and parameters that influence the selection of particular programs, and the parameters (no defaults!!) you choose for them.

Lesk, A. M. 2002. Intro to Bioinformatics. Oxford University Press (1X, red). Written as an intro textbook to accompany an online study guide web site for an undergrad course in bioinformatics, this book attempts to introduce readers to many of the concepts discussed in 711. Chapters 1 and 2 provide background information. Chapter 3 (Archives and information retrieval), chapter 4 (alignments and phylogenetic trees) and chapter 5 (protein structure and drug discovery) are of more interest, and outline how one might use existing programs and concepts to solve particular problems.
Skim chapter 1, for familiarity, then read chapter 3, 4 or 5. Summarize the main themes and approaches.

**Pevsner, J.** 2003. Bioinformatics and Functional Genomics. John Wiley & Sons (1X, red). This relatively new book was written by a neurobiologist who, for his work, needed to understand the fundamentals of extracting information from the plethora of genomes now being sequenced. It explains many of the modern program tools, and their uses. Chapters within each of the 3 parts cover many different topics we will discuss in class. But what is really special about this book, is Part III (Genome Analysis) because it covers “the tree of life” and how the various “omics” projects are impacting our perception of genetic relationships. Read Chapter 12 (Completed Genomes and the Tree of Life), and any other 2 chapters from Part III (i.e from among chaps 13-18). Summarize the key concepts and the challenges we will soon face as scientists and/or medical practitioners as more genome data becomes available. How has the existing information changed the way we think about evolution?

**Xiong, J.** 2007. Essential Bioinformatics. Cambridge University Press (1X, red). This is a very nice, comprehensive text covering many aspects of our 711 curriculum. Of particular interest are Section II (Sequence Alignment), Section IV (Molecular Phylogenetics, and Section V (Structural Bioinformatics). Read any one of these Sections in its entirety. Think about, then summarize (DON’T just list) the key themes and approaches for these methods. What are the key lessons to be learned, and cautions to be aware of when using these methods? Your summaries should make it clear that you have read (not just skimmed!) and understood the basic approaches.

**BLUE BOOKS:** (GENETIC CONCEPTS)


**YELLOW BOOKS:** (CLASSICAL PERSPECTIVES)

**Keller, E.R.** 2002. The Century of the Gene. Harvard University Press (1X, yellow). This easy to read narrative is divided into 4 chapters and a conclusion section, dealing with such prosaic topics as “What is an organism?” or “What is a gene?”. The book is designed to provoke informed discussion among non-scientists and record a general history of seminal discoveries pertinent to genomics, during the last century. Read any 2 chapters, give a brief description of their contents from the author’s point of view, then in your own words (and your own philosophy), comment on the “What is an organism?” and “What is a gene?” questions.

**Margulis, L., and Sagen, D.** 2002. Acquiring Genomes: A Theory of the Origin of Species. Perseus Book Group (1X, yellow). This very interesting recent book explores a new hypothesis for the origin of species. Instead of Darwinian inherited variation and random mutation as the origin of species, the authors propose generic mixing and genome merging as a source of spontaneous, quantum variation. Read part 1 (Evolutionary Imperative) and any other part that interest you. What do you think about this new idea?
Osawa, S. 1995. Evolution of the Genetic Code. Oxford University Press. (1X-P, yellow). OK, this could also be considered a “blue” book, but chapter 1 gives an excellent historical description of the unraveling of the genetic code and the experiments that went into deciphering the most important text of life. Read chapter 1, then choose at least one other chapter, from among #2 (the structure of the code), #6 (the evolving code), #9 (evolution of the code), or #10 (amino acid composition). Comment on the key features of the code, and whether you think these arose from frozen accidents, or by seeding from alternate origins.

Sayre, A. 2000. Rosalind Franklin and DNA. W.W. Norton Press (1X, yellow). Rosalind Franklin is frequently the forgotten participant in the discovery of the structure of DNA. She died before the Nobel Prize was awarded to Watson and Crick (and Wilkenson) and in an age when men dominated science, was never accorded her due, for her seminal contributions. Read this book (it's easy), then briefly summarize Rosy's contributions as a scientist, to this seminal discovery. Ladies in the class may find it particularly enlightening to learn how their counterparts struggled, not so long ago.

Tudge, C. 2000. The Impact of the Gene. Hill and Wang, New York (1x, yellow). This relative recent interpretation of pop-science for the masses, attempts to put some recent discoveries into perspective for the scientifically inclined general public. Read chapter 7 (Genes for Behavior) as this is probably the most original and interesting of the book's concepts. Summarize the main concepts and give your opinion on whether nature or nurture play dominant roles in determining our personalities. Are our genes our destinies?

GREEN BOOKS: (CONTEMPORARY VIEWPOINTS)

Bryant, J., LaVella, L.B., Searle, J. eds. 2002. Bioethics for Scientists. John Wiley & Sons (1X, green). This provocative series of essays by prominent bioethicists calls into question some of the central “freedom” of science tenets we hold so dearly, and places the responsibility for the consequences of new discoveries squarely on the shoulders of those scientists who make them. This is a must read for all young investigators working with genes or in the field of molecular biology. Read Part I (Setting the Scene), and in addition Part II (Ethics and the Natural World), or Part III (Ethical Issues in Agriculture and Food Production), or Part IV (Ethical Issues in Biomedical Science). Summarize what you have learned by reading these essays. Comment on how this information has changed, or will change your approach to science and your professional career. Why should ethics training be an obligatory part of every graduate student's curriculum?

Davies, K. 2001. Cracking the Genome: Inside the Race to Unlock Human DNA. Johns Hopkins University Press (1X, green). This book summarizes the historical and political battles to obtain funding for the human genome project, including the competing interests of academic and commercial interests. If you have an interest in a career in biotechnology, you should read this whole book, just for a primer and guide on these topics. Read chapter 1 (Knights of the Double Helix) and any other 2 chapters. Summarize the key people, or points.

Dawkins, R. 1989. The Selfish Gene. Oxford University Press, Oxford. (2X-1P of 3, green). A collection of 13 chapters covering many interesting and exciting new concepts in evolution. Select any 4 chapters (preferably consecutively) and write 2-3 paragraphs on each describing (a) the main ideas and (b) your views on these ideas.

Gould, S.J. 1973. Ever Since Darwin. W.W. Norton and Co., New York. (1X of 2, green). A collection of 33 essays divided into 8 sections. Read any 3 sections and write 2-3 paragraphs on each describing (a) the main theme and (b) why you agree or disagree with that theme. Note: section 8, "The Science and Politics of Human Nature" is particularly interesting!
Sykes, B. 2001. The Seven Daughters of Eve. W.W. Norton & Co (1x, yellow). This is a wonderful book, and if you start it, you will wish you read the whole thing! It chronicles the evolution of humans according to the chromosomal and mitochondrial evidence, as we now know it. Fascinating stuff! Read (minimum) Chapter 4 (The Special Messenger), chapter 14 (Adam joins the Party) and any additional 2 chapters between15-21, that describe the 7 human mitochondrial clades (and presumed origins of our ancestors and cultures). Do you think Sykes and his analyses are right? Do these directions make you think more about your own origins?

Wills, C. 1989. The Wisdom of the Genes: New Pathways in Evolution. Basic Books, a division of Harper Collins, USA. (1X of 2, green). This book deals with two questions: (1) Has the ability to evolve evolved? (2) Is there some way that the power of selection on individuals can be brought to bear on this ability to evolve? Read chapter 2 + 6 and 7, 9 or 10 and write 2-3 paragraphs on each describing (a) the main ideas and (b) your views on these ideas.