Literature

Please find below a selection of books and other resources that might come in handy for further reading. The list is certainly not comprehensive and if you have further suggestions for literature that should be listed here, let us know.

Books

Arthur Lesk - Introduction to Bioinformatics (2008), Oxford University Press

An Introduction to Bioinformatics introduces students to the immense power of bioinformatics as a set of scientific tools. The book explains how to access the data archives of genomes and proteins, and the kinds of questions these data and tools can answer, such as how to make inferences from data archives and how to make connections among them to derive useful and interesting predictions.

Blending factual content with many opportunities for active learning, An Introduction to Bioinformatics offers a truly reader-friendly way to get to grips with this subject, making it the ideal resource for anyone new to the field.

N. Jones and P. Pevzner - An Introduction to Bioinformatics Algorithms (2005),MIT Press Cambridge Massachusetts

This introductory text offers a clear exposition of the algorithmic principles driving advances in bioinformatics. Accessible to students in both biology and computer science, it strikes a unique balance between rigorous mathematics and practical techniques, emphasizing the ideas underlying algorithms rather than offering a collection of apparently unrelated problems.The book introduces biological and algorithmic ideas together, linking issues in computer science to biology and thus capturing the interest of students in both subjects. It demonstrates that relatively few design techniques can be used to solve a large number of practical problems in biology, and presents this material intuitively.An Introduction to Bioinformatics Algorithms is one of the first books on bioinformatics that can be used by students at an undergraduate level. It includes a dual table of contents, organized by algorithmic idea and biological idea; discussions of biologically relevant problems, including a detailed problem formulation and one or more solutions for each; and brief biographical sketches of leading figures in the field. These interesting vignettes offer students a glimpse of the inspirations and motivations for real work in bioinformatics, making the concepts presented in the text more concrete and the techniques more approachable.PowerPoint presentations, practical bioinformatics problems, sample code, diagrams, demonstrations, and other materials can be found at the Author's website.

P. Compeau and P. Pevzner - Bioinformatics Algorithms (2016), Active Learning Publishers, LLC

Bioinformatics Algorithms: an Active Learning Approach is one of the first textbooks to emerge from the recent Massive Open Online Course (MOOC) revolution. The bestselling companion to the authors'

acclaimed Bioinformatics Specialization on Coursera, this book presents students with a dynamic, "active learning" approach to learning bioinformatics. Covering fundamental topics in genomics, machine learning, and biological data science, it strikes a unique balance between practical challenges in modern biology and fundamental algorithmic ideas, thus capturing the interest of students of both biology and computer science. http://bioinformaticsalgorithms.com/

Dan Gusfield - Algorithms on Strings, Trees and Sequences (1997), Cambridge University Press

Traditionally an area of study in computer science, string algorithms have, in recent years, become an increasingly important part of biology, particularly genetics. This volume is a comprehensive look at computer algorithms for string processing. In addition to pure computer science, Gusfield adds extensive discussions on biological problems that are cast as string problems and on methods developed to solve them. This text emphasizes the fundamental ideas and techniques central to today's applications. New approaches to this complex material simplify methods that up to now have been for the specialist alone. With over 400 exercises to reinforce the material and develop additional topics, the book is suitable as a text for graduate or advanced undergraduate students in computer science, computational biology, or bio-informatics.

T.H. Cormen, C. Stein, C.E. Leiserson, R.L. Rivest - Introduction to Algorithms (2009), The MIT Press

This title covers a broad range of algorithms in depth, yet makes their design and analysis accessible to all levels of readers. Each chapter is relatively self-contained and can be used as a unit of study. The algorithms are described in English and in a pseudocode designed to be readable by anyone who has done a little programming. The explanations have been kept elementary without sacrificing depth of coverage or mathematical rigor. This second edition features new chapters on the role of algorithms, probabilistic analysis and randomized algorithms, and linear programming, as well as extensive revisions to virtually every section of the book. In a subtle but important change, loop invariants are introduced early and used throughout the text to prove algorithm correctness. Without changing the mathematical and analytic focus, the authors have moved much of the mathematical foundations material from Part I to an appendix and have included additional motivational material at the beginning.

W-H. Li - Molecular Evolution, Sinauer Associates

This text describes the dynamics of evolutionary change at the molecular level, the driving forces behind the evolutionary process, and the effects of the various molecular mechanisms on the structure of genes and genomes. It also explains the methodology involved in dealing with molecular data.

B. Alberts - Molecular Biology of the Cell (5th Ed), Garland Science, UK

The hallmark features of Molecular Biology of the Cell have been retained, such as its consistent and

comprehensive art program, clear concept headings, and succinct section summaries. Additionally, in response to extensive feedback from readers, the Fifth Edition now includes several new features.

By skillfully extracting the fundamental concepts from this enormous and ever-growing field, the authors tell the story of cell biology, and thereby create a coherent framework through which readers may approach and enjoy this subject that is so central to all of biology.

R. Merkl and S. Waack - Bioinformatik Interaktiv (2009), Wiley-VCH

Basic introduction to important algorithms in bioinformatics. Website with additional material and questions: http://www.wiley-vch.de/home/bioinformatik

Further Reads

- The Advantage of SMRT sequencing. Roberts et al. (2013) Genome Biology **14**:405 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3706782/

Resources

NCBI: http://www.ncbi.nlm.nih.gov/
The National Center for Biotechnology Information advances science and health by providing access to biomedical and genomic information.

PubMed: http://www.ncbi.nlm.nih.gov/pubmed
Scientific publications.

Taxonomy: http://www.ncbi.nlm.nih.gov/Taxonomy/taxonomyhome.html/index.cgi
The NCBI taxonomy homepage.

EMBL-EBI:http://www.ebi.ac.uk/services
Bioinformatics services.

Biological Tutorial:
https://wikispaces.psu.edu/display/Biol230WFall09/Subcellular+Architecture+and+Experimental+Approaches+to+Cell+Biology
Subcellular architectures of typical animal and plant cells.

Goblet: http://www.mygoblet.org/
Global Organisation for Bioinformatics Learning, Education & Training.

Elements of Bioinformatics: http://elements.eaglegenomics.com/