Harvard TH Chan School of Public Health

Department of Biostatistics

BST 280: Introductory Genomics & Bioinformatics for Health Research

Fall 2017

Monday and Wednesdays, 2:00 pm – 3:20 pm
Fall Term FXB G13
Lab Session Tuesday, 5:30-7:00, FXB G10 (or TBD)

Instructors

John Quackenbush
Professor of Computational Biology and Bioinformatics
Dana-Farber Cancer Institute, Smith 822
450 Longwood Avenue
Boston, MA 02215
617-582-8163
Email: johnq@jimmy.harvard.edu

Teaching Assistant

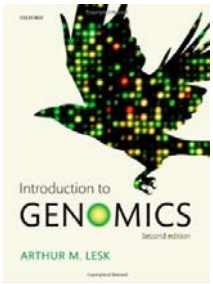
Conor Foley
Email: cof090@mail.harvard.edu
Office Hours: TBD

Lab Section:

Tuesday, 5:30-7:00, FXB G10 (or TBD)

Suggested (Optional) Textbook:

Introduction to Genomics, Arthur M. Lesk, Oxford University Press



Additional Materials:

To be posted to the course website

Learning Objectives

At the conclusion of the course, a student will be able to:

- interpret studies involving modern laboratory methods of genomic analysis including sequencing, expression profiling, SNP mapping, and proteomics
- effectively use biomedical and genomic data resources including those at the NCBI, EBI, EnsEMBL, and UCSC
- use genomic sequence information to address a wide range of problems
- apply ontologies and pathway databases for the meta-analysis of genomic data
- analyze gene expression and other “high-dimensional” ‘omic data
- apply network-based methods for genomic analysis and systems biology
- perform some rudimentary analysis of genomic data using R/Bioconductor

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Course Objectives

This survey course is intended for a wide audience and will provide an introduction to genomics techniques and gene mapping, and tools for their analysis. The course will cover technologies including genome sequencing, transcriptomics, and proteomics and will provide an introduction to the tools and methods used to analyze data. The course will feature homework sets built around analysis of "real" datasets with the goal of introducing students to both the techniques and resources available to conduct research in the "post-genome world."

Outcome Measures

Class Participation: 30%
Homework: 40%
Exam: 30%

Tentative Class Schedule and Assigned Readings

Date	***Topic***	***Reading***
October 23	Introduction to the Course: Why Genomics?	Lesk, Chapter 1
October 25	Guest Lecture: Applications of Genomics Maud Fagny, Human Evolutionary Perspectives Introduction to NCBI Resources I	Lesk, Chapter 2
October 30	Introduction to NCBI Resources	Lesk, Chapter 3
November 1	Introduction to NCBI Resources II	Lesk, Chapter 2; 3 Assigned Reading TBD
November 6	Sequence Comparisons, Ultra-high Throughput Sequencing	Lesk, Chapter 4, 5
November 8	Comparative Genomics, Evolution, and the HapMap	
November 13	Gene Expression Primer	Lesk, Chapter 9 Assigned Reading TBD
November 15	Quantitative Methods for Expression Analysis Intro to WebMeV	Lesk, Chapter 9
HW #1	**DNA Sequence Analysis**	**DUE 11/15 5:00 pm**
November 20	Applications of Microarray Analysis to Human Cancer	Assigned Reading TBD
November 22	Thanksgiving Tomorrow – No Class	
November 27	Moving Beyond Excel: Intro to R for RNA-seq I Guest Lecture: Yaoyu Wang	
November 29	Moving Beyond Excel: Intro to R for RNA-seq II Guest Lecture: Yaoyu Wang	Lesk, Chapter 9
December 4	Proteomics and Metabolomics	Lesk, Chapter 11
December 6	Introduction to Networks	Lesk, Chapter 11
December 11	Other Approaches to Networks Possible Guest Lecture: Kimberly Glass	Lesk, Chapter 11
December 13	**Exam**	
HW #2	**Expression Analysis**	**DUE 12/12 5:00 pm**