Spring 2011
Mondays 3 PM to 6 PM
SCL 204
Prerequisite: GCB 531 Intro to Genomics or equivalent or permission of instructor
Class Size limited to 16.

The class will meet once a week for a 3 hr period. Recent papers from the primary genomics literature will form the core material for the course. Each 3-hr session will feature a major topic or set of related topics in Genomics, with student presentations (usually two per session) centered on papers selected within the topic area(s). While the “presenting” student will give a 10-15 min introduction to the paper and will show powerpoint slides of the data in the paper, all students in the class are expected to have read and to be prepared to discuss the papers presented. For example, following the introduction, non-presenting students will be called upon to explain a particular table or figure, or to discuss a point raised in the paper.

There will be one major writing assignment that will be considered the midterm, but no final exam. Near the middle of the course, students will be assigned a set of key recent papers on a particular genomics topic, and asked to write a review article (similar to Nature News and Views) synthesizing the key ideas in the papers and explaining their significance. This is essentially identical to what has been, in past years, a writing component of the GCB prelim qualifying exam (it is no longer part of the GCB prelim). Students will have 1 week to complete the review article once they have been given the topic and papers. The topic and papers will be selected jointly by the course organizer and the GCB curriculum committee; it will count for 50% of the grade for the class. The remaining portion of the grade will be based upon the student presentations and upon class participation.

Some topics will be decided upon jointly by the students and the course organizers during the Introductory/Organizational meeting on the first scheduled day of class.

Mandatory Topics selected by course organizers

Gene Expression Profiling
High-throughput Sequencing (Solexa, 454 and SOLiD) Applications
Genome-wide Location Analysis, ChIP
HapMap and Association Studies, 1000 genomes project
DNA re-sequencing and mutational profiling
Analysis of Copy Number Polymorphisms (CNPs) and Structural Variation
Genome-wide functional analysis using RNA interference
Protein Interaction Networks
Epigenomics
Cancer Genomes

Examples of Elective Topics (to be selected by students)

Comparative Genomics and Genome Annotation
Ecological Genomics/ Metagenomics
Comparative Genomics and Human-Primate comparisons
Synthetic Biology
Proteomics and biomarkers
SNPs and the regulation of gene expression.
Variation in Gene Expression, e-QTLs
Genome-wide functional screens
New DNA sequencing technologies
Other…

Students select papers for presentation from among the selected topics, subject to approval by the course organizers.

Note: for all papers, Supplementary figs and tables will also be discussed.

Monday Jan 17. MLK day, no class

Selection/assignment of initial dates and topics for individual student presentations (by e-mail).


Scott Sherrill-Mix: Pacific Biosystems Single-molecule Sequencing (2 papers)

Real-Time DNA Sequencing from Single Polymerase Molecules
http://www.sciencemag.org/content/323/5910/133.full
Direct detection of DNA methylation during single-molecule, real-time sequencing
http://www.nature.com/nmeth/journal/v7/n6/abs/nmeth.1459.html

Fan Li:

Genome-wide measurement of RNA secondary structure in yeast.

Monday Jan 31.
Ruth Elliott:
Rearrangements of the RAF kinase pathway in prostate cancer, gastric cancer and melanoma

Hannah Dueck:
Whole-genome molecular haplotyping of single cells
(http://www.nature.com/nbt/journal/v29/n1/pdf/nbt.1739.pdf)

Monday Feb 7.

Varun Aggarwala
Genome-wide methylation analysis identifies epigenetically inactivated candidate tumour suppressor genes in renal cell carcinoma Oncogene advance online publication 6 December 2010; doi: 10.1038/onc.2010.525
http://www.nature.com/onc/journal/vaop/ncurrent/full/onc2010525a.html

Judy Wang
http://www.nature.com/nature/journal/v468/n7325/full/nature09634.html
Gene expression divergence recapitulates the developmental hourglass model

Monday Feb 14.

Yih-Chii Hwang
Mapping of long-range associations throughout the fission yeast genome reveals global genome organization linked to transcriptional regulation

Gabe Walton
High-resolution genome-wide in vivo footprinting of diverse transcription factors in human cells" by Alan Boyle, et. al. 
http://genome.cshlp.org/content/early/2011/01/20/gr.112656.110.full.pdf+html?rss=1

Monday Feb 21.  Room 601 SCL (only room change in semester)

Monday Feb 28.

Monday Mar 7.

Monday Mar 14.

Midterm assignment distributed Mar 14, due Mar 21 (the Midterm dates are tentative and might be adjusted to avoid conflicting midterms)

Monday Mar 21.

Monday Mar 28.

Monday Apr 4.

Monday Apr 11.

Monday Apr 18.

Monday Apr 25.