Bi188 Spring 2013 Syllabus

April 5: Course overview and goals. Profs Wold and Hacia

Conditions of course: No external (non-Caltech) dispersal of course materials, including slides; notes; papers; problem sets etc. This condition transfers, under the honor code to anyone at Caltech with whom you share the materials.

You will receive slides shown in class and associated outline via the course website. `http://woldlab.caltech.edu/bi188/index.shtml`

- diagnostic questions
- e-mail contacts for students
- first non-compute problem set posted, due by 3pm on April 12.

B. Wold: Introduction to human genome structure, sequence variation and mutation; Intro to modern methods of analysis.

Reading:

1. From Watson: background brush-up on gene anatomy and kinds of gene products;
2. Olson 2002 JMB (first section required; remainder recommended);
3. Ng et al., 2009.

April 8 and 9: Computational tutorial

Tutorial on how to use UNIX, Python, the computer we have set up for you to use for the class and the main computational tools you will need to know how to work with for the first exercise.

April 12: Mendelian traits and genomics. Wold

- ∼20 min consolidation on compute exercise: Marinov

April 19: Cancer genetics and genomics I: Somatic mutations. Wold

- Oncogenes, tumor suppressors, mutators, pathways, transcriptomes and tumor classification.
- Introduction to transcriptome measurements and structure
- Specifics of RNA-seq measurements (for second computational exercise) ∼15 min.
- Problem Set 2 posted, due by 3pm on April 26.

April 26: Cancer genetics and genomics II. Wold/Hacia

- Genomic analysis of large numbers of tumors. Precision genomic signature of individual tumors and implications.
- Analysis of tumor/normal pairs for diagnosis and classification.

May 3: Midterm Exam review and handout. Goh/Marinov/Fisher/

- Computational Exercise 2 posted, due by 3pm on May 31.

May 10: Comparative Genomics. Hacia

- Problem Set 3 posted, due by 3pm on May 17.

May 17. Wold

- Genetics and genomics of globinopathies, complex loci, modifiers
- GWAS studies and their intersection with functional genomics
- Computational Exercise 2 posted, due by 3pm on May 31.
- Problem Set 4 posted, due by 3pm on May 24.

May 24. Hacia

- Multi-chromosome disorders; origins; modern DNA testing
- 1000 genomes, complex traits

May 31. Hacia/Wold

- From comparative genomics to inherited disease to drug screens and gene therapy.
- The full cycle of discovery to therapy in a human genetic disorder.
- Gene-based pharmaceuticals.
- Stem cell therapies and IPS cells

June 3: Final Exam

- Final Exam hand out on June 3.
- Review session for exam. June 3
- Exam due June 7.