Genomic Approaches and Analysis
Biology 493/593 Spring 2011
TTh 12:00-1:20, MCK 240B. Computer labs in Kla 33.
Project work in Streisinger 315.

Instructor:
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Office hours: Wednesday 2-3 PM

Course Goals: This course will introduce students to methods for studying biological questions on a genome-wide level. We will examine approaches to measure changes in genomic DNA composition, transcript and protein levels, and molecular interactions as a function of history, genetics, or environment. Analytical methods for interpreting the large bodies of data generated by these methods of experimentation will be discussed. These concepts will be put into practice by a course project and presentation at the end of the term.

Course requirements:
Students are required to attend class, to read the assigned material and to participate in class discussions. Small groups will present recent papers for discussion. In addition each small group will perform a genomic experiment and present their results and analyses. There will be two graded tests.

Readings and Homework
The required readings are the primary literature papers, pdfs of which will be available on the class website, and readings from Genomes, links to which are on the syllabus. Homework for each week is to be done before the Tuesday class.

Grading
Tests: 40%
Project: 30%
Homework and Labs: 20%
Class participation: 10%

Class schedule
Week 1
Homework: Register at the Galaxy sequence analysis server http://main.g2.bx.psu.edu/user/create

Mar 29
Introduction to genomes – size and complexity, and sequencing technologies
Readings: Genomes Human Repetitive
1
Mar 31
Introduction to genomes - sequencing
Assembly

Week 2
Homework: watch the Galaxy tutorial http://www.openhelix.com//cgi/tutorialInfo.cgi?id=82 through the summary section.

Apr 5
Sequencing computer lab
Kla 33
sequence lab
Galaxy trial run
2
Apr 7
SNP mapping intro
Mapping

Week 3
Homework: windshield splatter exercise http://main.g2.bx.psu.edu/u/aun1/p/windshield-splatter

Apr 12
SNP computer lab
Kla 33
SNP lab
Galaxy work
3
Apr 14
Sequence & SNP papers

Week 4
Apr 19
Test 1
4
Apr 21
SAGE & HTS expression intro
Expression (don't read proteome section) Also, see RNA analysis

Week 5
Homework: Gene expression analysis http://main.g2.bx.psu.edu/u/jeremy/p/galaxy-rna-seq-analysis-exercise

Apr 26
Project proposal presentations
Microarray intro
5
Apr 28
SAGE computer lab
Kla 33
See Course Documents in Blackboard for instructions
Galaxy work

Week 6
May 3
Project set-up
Str 315
6
May 5
Project work
Str 315

Week 7
May 10
Gene expression papers
7
May 12
Gene Networks/Function intro

Week 8
May 17
Network/Functional genomics computer lab
Kla 33
Network lab
8
May 19
Project Data Analysis
Str 315 & Kla 33

Week 9
May 24
Midterm2
Network/Functional genomics papers
9
May 26
Thanksgiving holiday
Week 10
May 31
Student presentations
10
Jun 2
Student presentations