

Genomic Approaches and Analysis
Biology 493/593 Winter 2013
TTh 12:00-1:20, DEA 106. Computer labs.
Team project work in Streisinger 315.

Instructor:
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Office hour: Friday 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 (due Thursday) : Register at the Galaxy sequence analysis server <http://main.g2.bx.psu.edu/user/create>

Jan 8

Introduction to genomes – size and complexity, and sequencing technologies

Readings: <http://www.ncbi.nlm.nih.gov/books/NBK21120/> sections 2.1.1 up to 2.2.2
<http://www.ncbi.nlm.nih.gov/books/NBK21134/> sections 1.2

1

Jan 10

Introduction to genomes - sequencing

<http://www.ncbi.nlm.nih.gov/books/NBK21117/> Sections 6.2 and 6.3

Week 2

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

Jan 15

Sequencing computer lab

Kla 33

[sequence lab](#)

Galaxy trial run

2

Jan 17

SNP mapping intro

<http://www.ncbi.nlm.nih.gov/books/NBK21116/> the whole chapter

Week 3

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

Jan 22

SNP computer lab

Kla 33

[SNP lab](#)

Galaxy work

3

Jan 24

Team presentations: Sequence & SNP papers

Week 4

Jan 29

Test 1

4

Jan 31

SAGE & HTS expression intro

<http://www.ncbi.nlm.nih.gov/books/NBK21136/> up to 7.3.2. Also, see <http://www.ncbi.nlm.nih.gov/books/NBK12777/>

[Project proposal presentations](#)

Week 5

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

Feb 5

[Project set-up](#)

[Str 315](#)

5

Feb 7

[Project work](#)

[Str 315](#)

Week 6

Feb 12

Project work

Str 315

6

Feb 14

more RNAseq/Microarrays Lecture

~~SAGE computer lab~~

~~Kla 33~~

~~See Course Documents in Blackboard for instructions~~

~~Galaxy work~~

Week 7

Feb 19

Team presentations: Gene expression papers

7

Feb 21

Gene Networks/Function

Epigenetics

Week 8

Feb 26

Network/Functional genomics computer lab

Kla 33

[Network lab](#)

8

Feb 28

Team presentations: Network/Functional genomics papers

Week 9

Mar 5

Project Data Analysis

Str 315 & Kla 33

[Midterm 2 due](#)

9

Mar 7

Project Data Analysis

Str 315 & Kla 33

Week 10

Mar 12

Student presentations

10

Mar 14

Student presentations