

SEA-Phages – Bioinformatics of SEA-Phages – Spring 2016

Instructor: Eric S. Ho (hoe@lafayette.edu)

Office: Kunkel 13

Office hours: Tue 2-4 pm

Lab: Thursday 1:10-4:00 pm, Venue: AEC 519

TAs: Sze Cheng (chengs@lafayette.edu) and Sean Menarguez (menargus@lafayette.edu)

Course Description:

This course is the second part of the HHMI Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science program, aka SEA-Phages. The overarching goal of SEA-Phages program is to teach students science by doing science. In the second part of SEA-Phages program, you will learn how to use bioinformatics tools to annotate the two novel bacteriophage genomes, olive and tinyblot, isolated by two of your classmates in the Fall.

This is a lab course so majority of the time you will spend on annotating genes. Lectures will be given occasionally to supplement lab work including bacteriophage genome architecture, gene structure of bacteriophage, workflow of the annotation process, and instructions of using bioinformatics tools.

Learning Outcomes:

At the completion of this course, you should be able to:

- Identify start sites of phage genes using computational tools
- Utilize homology information to infer gene functions
- Document findings in electronic notebook
- Communicate findings with team member
- Work effectively as a team member

Prerequisites:

BIOL 101 or 102

Grading Policy:

Your grade for SEA PHAGES represents 30% of your BIOL 102 grade and will be determined as follows:

- A computer based lab quiz (30%)
- Quality of gene annotation (30%)
- Completion of gene annotation (20%)
- Written report and archiving (10%)
- Group Presentation (10%)

The computer based lab quiz will take place during regular meeting time. In the quiz, you will be asked to use bioinformatics tools to annotate two or more novel genes.

Each week, you are required to submit report for the genes you have annotated to Moodle. The overall quality of the annotation will count toward part of the grade.

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On average, you will annotate 25 to 30 genes in this semester. You should finish the annotation of all genes assigned to you.

Each group selects a gene for presentation. You should include the following in your presentation:

- Function of the gene and evidence to support the function
- Structure of the protein encoded by the gene, if available
- How it helps the phage to maintain virulence

Course Materials:

You will be provided with a lab manual “*Annotation and Bioinformatic Analysis of Bacteriophage*” which is available in Moodle. The manual provides instructions of all the tools required and the procedure for you to annotate the genes.

Additional resources:

- Actinobacteriophage Database at PhagesDB: phagesdb.org
- Homology detection and structure prediction webtool (HHPred) <http://toolkit.tuebingen.mpg.de/hhpred>
- NCBI BLAST programs: <http://blast.ncbi.nlm.nih.gov/Blast.cgi>
- Biomedical literatures database, PubMed: <http://www.ncbi.nlm.nih.gov/pubmed/>

Attendance Policy:

Attendance and class participation are critical to learning. Although attendance will not be taken, your lab partner needs you, so please come to support your partner!

Federal Credit Hour Policy:

The student work in this course is in full compliance with the federal definition of a four [two or one as appropriate for half and quarter unit courses] credit hour course. Please see the Registrar’s Office web site (<http://registrar.lafayette.edu/additional-resources/cep-course-proposal/>) for the full policy and practice statement.

Academic Honesty:

You are expected to abide by the college policy on Intellectual Honesty (see Student Handbook p.7).

Disability Statement:

In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students must register with the Office of the Dean of the College for disability verification and for determination of reasonable academic accommodations.

Privacy Policy:

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Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws.

Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Tentative Schedule:

Week	Date	Major Topics
1	Jan 28	Course overview
2	Feb 4	Gene annotation
3	Feb 11	Gene annotation mechanic
4	Feb 18	Gene annotation
5	Feb 25	Gene annotation
6	Mar 3	Glimer/GeneMark; Function annotation
7	Mar 10	BLAST; Function annotation
8	Mar 17	Lab quiz
9	Mar 24	Spring Break
10	Mar 31	Phage Clusters; Merge annotations
11	Apr 7	Switch genome; Gene annotation
12	Apr 14	Switch genome; Gene annotation
13	Apr 21	Poster Preparation
14	Apr 28	Group presentations
15	May 5	Phylogenetic trees