Phage Hunters Advancing Genomics and Evolutionary Science (PHAGES)
Introductory Biology Research Laboratory I – Spring 2016
BIOL 1750.501, MW 12:00-2:50pm and other times as needed
BIOL 1750.502, MW 3:00-5:50pm and other times as needed

INSTRUCTOR: **Dr. Lee Hughes**
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Textbook: **"SEA-PHAGES *Streptomcyes* Laboratory Manual" by the Howard Hughes Medical Institute (manual provided online to students for use during the course)**

PHAGE Laboratory Courses:

The Phage Hunters Advancing Genomics and Evolutionary Science (PHAGES) experience at UNT is offered in association with the Howard Hughes Medical Institute's Science Education Alliance. PHAGES is a national experiment in both research and education that revolves around a research course in genomics for undergraduate students. UNT students who participate in this program will enroll in a two course sequence (BIOL 1750 for 2 SCH in the first semester and BIOL 1755 for 1 SCH in the following semester) in which research activities on bacteriophage genomics will be conducted. These two laboratory courses will serve as replacements for the normal BIOL 1760 laboratory in the biology or biochemistry major and may also be used as a Discovery course in the UNT core curriculum for students in those majors. **By participating in the PHAGES course this semester, you are committing to continue in the second semester.**

Due to the nature of experimental research, the course syllabus for this laboratory will be more flexible than in a normal course. **Attendance is required** at all scheduled laboratory meetings and **on-time arrival** is critical (three tardies will equal one absence in grading). Excessive absences or tardies may result in additional grade reduction. As well, students should expect to attend **additional open laboratory times** as needed each week depending on the progress of their particular samples.

Laboratory Goals:

The goals for the first semester include the following:

- Each student will learn the microbiological techniques necessary to cultivate bacteria and bacteriophage.
- Each pair will isolate a unique bacteriophage from an environmental sample of their choosing.
- Each pair will obtain a high-titer lysate of their isolated phage.
- Each pair will obtain an electron micrograph of their isolated phage.
- Each pair will obtain a clean DNA sample for their isolated phage and create a restriction digest.

Based on the electron micrographs, restriction digests, and quality of DNA preparations, the class will identify through a "Phage Olympics" the samples to be submitted for genome sequencing. At least one genome sequence will be obtained for study in the second semester of the laboratory sequence.

STUDENTS WITH DISABILITIES:

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940-565-4323.

GRADING:

Your course grade will consist of the following elements:

- 12% Attendance (4% per absence or per 3 tardies)
- 16% Daily Procedures (due at start of class)
- 18% Laboratory Notebooks (3 checks x 6% each)*
- 12% Concept Quizzes (4 x 3% each, will be announced 1 class meeting in advance)
- 6% Phage Olympics Short Presentation (3-5 minute Powerpoint presentation highlighting the characteristics of your isolate)
- 12% Final Class Presentation and written report (5-8 minute presentation detailing semesters work; paper to follow scientific paper format given in Phage Resource Guide)
- 24% Archiving Report and samples**
- 100% Overall % Grade *(Letter grades will be assigned on a typical scale: 90+=A, 80-89=B, 70-79=C, 60-69=D, <60=F)*

* Notebooks are property of the lab and must never leave the laboratory. If a notebook is removed from the lab this will result in an automatic grade of zero on the next scheduled notebook grade. A second occurrence may result in removal from the course.
**Must be received to obtain passing grade in course

TENTATIVE LABORATORY SCHEDULE
INTRODUCTORY BIOLOGY RESEARCH LABORATORY I

Meeting	Date	Topic	Readings
1	Jan. 20	Course overview; Safety; Laboratory Techniques and Sampling Methods. Begin Enrichment. Sampling instructions for Direct Plating.	"Before You Start"; Capture Part A and Part C
2	Jan. 25	Harvest enriched samples. Direct plating of weekend samples.	Capture Part B
	Jan. 27	Pick plaques, perform spot assays from enrichments and direct platings.	Tame A.1-A.3
3	Feb. 1	Phage Streak Protocol on confirmed samples.	Tame A.4-A.8
4	Feb. 3	Continue Phage Streaks for purification	
5	Feb. 8	Continue Phage Streaks for purification	
6	Feb. 10	Perform Phage Titer assay on purified phage.	Tame A.9-A.14
7	Feb. 15	Harvest 1-plate lysate. Titer lysate.	Tame A.15-A.20

8	Feb. 17	Titer lysates or spot tests. Set up Empirical Test.	Tame B.21-B.24
9	Feb. 22	Set up 10 plate lysate.	Tame B.25-B.27
10	Feb. 24	Harvest 10 plate lysate	Tame B.27-B.29
11	Feb. 29	Titer High Titer Lysate	Tame B.29
12	Mar. 2	Electron microscopy	Dissect A.1-A.3
13	Mar. 7	Extract and purify DNA	Dissect B.4-B.7
14	Mar. 9	DNA quantification; restriction analysis	Dissect C.8-C.9
15	Mar. 14 & 16	No Class (Spring Break)	
16	Mar. 21	Agarose gel electrophoresis of restriction analysis	Dissect C.9-C.11
17	Mar. 23	Analysis of restriction results and comparison with known mycobacteriophage in database. Class discussion	Dissect C.11-C.15
18	Mar. 28	Genomic DNA Quality Control/Visit Electron Microscopy Facility	Dissect D.16-D.19
19	Mar. 30	Prepare short presentations/ Visit Electron Microscopy Facility	
20	Apr. 4	Catch up day if needed/TBA	
21	Apr. 6	Present Phage Olympics Short Presentation	
22	Apr. 11	Write up Archiving reports/Archive Samples	Appendix 3&4
23	Apr. 13	Submit Quality Control Gel to Sequencing Center	
24	Apr. 18	Write up Research Papers/Archive Samples	
25	Apr. 20	Submit approved DNA sample(s) to Sequence Center	
26	Apr. 25	Write up Research Papers/prepare Final Class Presentations	
26	Apr. 27	Write up Research Papers/prepare Final Class Presentations	
27	May 2	Final Class Presentations	
28	May 4	End of Semester Wrap up	