Phage Hunters Advancing Genomics and Evolutionary Science (PHAGES)
Introductory Biology Research Laboratory I – Spring 2026
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

Program Director: **Lee Hughes**
Office: Life Sci A223, lhughes@unt.edu
Student Hours: By appointment

TEACHING ASSISTANTS:
.501 **Alireza Momeni**
Office: Life Sci A224, alirezamomeni@my.unt.edu
Office Hours: TBD
.502 **Noah Cone**
Office: Life Sci A224, NoahCone@my.unt.edu
Office Hours: TBD

Textbook: **"Phage Discovery Guide - *Streptomyces*" by the Howard Hughes Medical Institute (manual provided online through Canvas for student use)**

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 an undergraduate research experience 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 degrees. **By participating in the PHAGES course for both semesters you will become published in a scientific genomic database and potentially become an author on scientific articles about the phages on which you work.**

Course Materials:
All course materials are available through Canvas at unt.instructure.com.

Laboratory Goals:
The goals for the first semester are as follows. Each student will:

- Learn the microbiological techniques necessary to cultivate bacteria and bacteriophage.
- Isolate a unique bacteriophage from an environmental sample of their choosing.
- Obtain a high-titer lysate of their isolated phage.
- Obtain an electron micrograph of their isolated phage.
- 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 the DNA 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.

Laboratory Safety:
Following all laboratory requirements is important for the safety of you and your classmates. You must comply with all safety requirements as outlined during the lab safety training.

Students enrolled in BIOL 1750 are required to use proper safety procedures and guidelines as outlined in UNT Policy 06.038 Safety in Instructional Activities. While working in laboratory sessions, students are expected and required to identify and use proper safety guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions and hot and cold products. Students should be aware that the UNT is not liable for injuries incurred while students are participating in class activities. All students are encouraged to secure adequate insurance coverage in the event of accidental injury. Students who do not have insurance coverage should consider Standard Syllabus Statements Related Policy 06.049 Course Syllabi Requirements obtaining Student Health Insurance. Brochures for student insurance are available in the UNT Student Health and Wellness Center. Students who are injured during class activities may seek medical attention at the Student Health and Wellness Center at rates that are reduced compared to other medical facilities. If students have an insurance plan other than Student Health Insurance at UNT, they should be sure that the plan covers treatment at this facility. If students choose not to go to the UNT Student Health and Wellness Center, they may be transported to an emergency room at a local hospital. Students are responsible for expenses incurred there.

Attendance Requirements:
Attendance and on-time arrival are critical at all scheduled laboratory meetings. Communication with your TA is key in situations where you are unable to attend lab to ensure continued progress on your sample. Unexcused absences or failure to make arrangements for catch up work for excused absences may result in lower grades or zeroes on daily notebook checks, lab quizzes, and other graded course activities.

Attendance is particularly important for research presentation days to both present and observe the presentations of your classmates. Students arriving late on any presentation day will have their grade on the presentation reduced by 10%. Students who do not present on the scheduled date will receive a grade of "0" for the presentation unless the instructor is contacted in advance about an unavoidable absence.

It is important that you communicate with the professor and the instructional team prior to any absence, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings due to illness or other unavoidable circumstances.

If you are experiencing any symptoms of COVID-19 or any other illness please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. While attendance is an important part of succeeding in this class, your own health, and those of others in the community, is more important.

ADA Accommodation Statement:
UNT 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 a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students 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. For additional information see the ODA website at disability.unt.edu.

Emergency Notification & Procedure:
UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

Communication:
Please communicate with the instructor or TA during scheduled lab time or through email. You may also schedule other meeting times as needed. Please note that our email inboxes can become rather full during busy times, so if you do not receive a response within two business days, please send a follow-up email. A gentle nudge is always appreciated.

All course communications will be through Canvas. Be sure to check Canvas announcements regularly and to setup your Canvas notifications to send updates to an email address that you regularly check.

Academic Integrity Standards and Consequences:
According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. Students in this course are expected to do their own work except when instructed to work in groups. Academic dishonesty in graded coursework may result in a grade of zero for that activity or additional penalties as allowed under university policy. All instances of academic dishonesty will be reported to the University.

Scientific Records and Data:
Students in this laboratory contribute to a scientific research project on bacteriophage biology. Student work relating to the collection and reporting of scientific data are maintained beyond the end of the course as part of the scientific record.

Late Work:
All assignments and other work in this course are due by the date and time given in the syllabus, posted in Canvas, or announced in class. All due dates will be announced at least one week in advance. Late work may receive a grade of zero or may be accepted with a grade reduction at the discretion of the instructor.

Grading:
Your course grade will consist of the following elements:

15%	Pre-lab Activities/Quizzes
20%	Laboratory Notebooks (averaged from multiple checks throughout the semester)
15%	Concept Quizzes
5%	Short Presentation (3-5 minute Powerpoint presentation highlighting the characteristics of your isolate)
12.5%	Final Class Presentation (5-7 minute presentation on the work completed during the semester)
12.5%	Final Lab Report (paper in the format of a scientific research article)
20%	Archiving of samples and electronic database completion*
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)*

*Must be received for all successful phage isolations to obtain passing grade in course.

TENTATIVE LABORATORY SCHEDULE
INTRODUCTORY BIOLOGY RESEARCH LABORATORY I

Due to the nature of experimental research, the course syllabus schedule for this laboratory will be more flexible than in a normal course, and the schedule may change as experimental progress requires.

Meeting	Date	Topic	Readings
1	Jan. 12	Course overview; Safety; Introduction to Phage Hunting.	Welcome, Lab Basics, Phage basics, Day 1 Module
2	Jan. 14	Laboratory Techniques and Sampling Methods. Begin Enrichment.	Protocol 5.1, Protocol 5.5 (Day 1), Day 2 Module
	Jan. 19	MLK Jr. Day – No lab	
3	Jan. 21	Harvest enriched samples and perform plaque assay. Sample 2 Enrichment	Protocol 5.5 (Day 2), Protocol 5.3, Host basics, Day 3 Module
4	Jan. 26	Pick plaques, perform spot assays from enrichments. Continue with sample 2 (if needed).	Protocol 5.4, Protocol 5.6, Day 4 Module
5	Jan. 28	Perform Plaque assay on purified phage.	Protocol 6.1 and Protocol 6.2, Day 5 Module
6	Feb. 2	Continue Plaque assay for purification as needed.	
7	Feb. 4	Continue Plaque assay for purification as needed.	
	Feb. 9	Catch up day.	
8	Feb. 11	Harvest 1-plate lysate. Spot titer lysate.	Protocol 6.3, Protocol 6.4, Day 8 Module
9	Feb. 16	Calculate amounts for webbed plates.	Protocol 7.1, Day 9 Module
10	Feb. 18	Set up Webbed Plates from Lysate of Known Titer.	Day 10 Module
11	Feb. 23	Harvest Multi-plate lysate and perform spot titer.	Day 11 Module
12	Feb. 25	Calculate phage titer. Repeat as necessary. If HTL, name phage and enter into PhagesDB.	Protocol 7.2 Protocol 11.2, Day 12 Module
	Mar. 2	DNA day 1 (phage precipitation) Begin Lysogen testing – Day 1 Phage Seeded Plates	Protocol 9.1c, Day 13 and 14 Module, Protocol 11.2 (see Phage Discovery Guide update)
13	Mar. 4	DNA day 2 (extract and purify DNA) Lysogen testing – Photograph plates/Calculate EOL	Protocol 9.1
	Mar. 9 & 11	Spring Break – no labs	

14	Mar. 16	Lysogen testing – Streak candidate colonies (approx. 5)	
15	Mar. 18	DNA quantification; restriction analysis	Protocol 10.1, Day 15 Module
16	Mar. 23	Agarose gel electrophoresis of restriction analysis Lysogen testing – Second streak from isolated colony on each candidate plate	Protocol 10.2, Protocol 10.3, Day 16 Module
17	Mar. 25	Analysis of restriction results and comparison with known actinobacteriophage in database. Calculate remaining DNA volume and amount in ug. Short Presentation Details. Set up DNA extraction if repeat needed.	Protocol 10.4, Day 17 Module
	Mar. 30	DNA extraction repeat if needed. Lysogen testing – Inoculate liquid culture for Phage Release Assay of each candidate	Protocol 11.4 (new manual)
18	Apr. 1	Host range testing. Restriction analysis repeat if needed.	Protocol 11.5 (Streptomyces manual), Day 18 Module
19	Apr. 6	Host Range results discussion. DNA gel repeat if needed. Prepare short presentations. Assign Final Presentation and Paper. Lysogen testing – Spot plate testing for phage release	Protocol 8.1a, Protocol 8.1b
	Apr. 8	Lysogen testing – record phage release spot test plate results. Finalize data cards. Save confirmed lysogen cultures Catch Up Day (as needed). Work on presentations.	Protocol 11.5 (new manual)
20	Apr. 13	Present short presentations.	
21	Apr. 15	Archive Samples (phage and lysogens). Clean lab and check out.	
22	Apr. 20	Complete PhagesDB archiving entry (all relevant fields).	Protocol 7.3
23	Apr. 22	Work on final presentation and paper	
24	Apr. 27	Present Final Presentation	
25	Apr. 29	Final Paper due.	