

# Fall 2025

Biotechnology Program, Department of Life Sciences  
University of New Hampshire, Manchester



## BMS 504 / BIOT 655: Phage Genetics / Advanced Phage Biology

**Instructor:** Dr. Kristen Johnson, Associate Professor  
**Office:** Room 630  
**Office Hours:** Thurs 1-2 pm, Room 630; *and by appointment*

Lab (Rm 554): M/W, 1:10-3:30 pm

### COURSE DESCRIPTION

Phage Genetics / Advanced Phage Biology is a 1 – 2 semester-long research project course designed as a sequel to the Phage Discovery and Bioinformatics courses. In the GENES project, students generate expression libraries for phage genes, test for the ability of phage gene products to modulate bacterial host phenotypes, and screen phage gene products against the bacterial host proteome to identify putative host target(s). GENES research incorporates microbiology, molecular biology, and genetics techniques. *Prereq: Phage Discovery and Bioinformatics, prior phage experience, or instructor permission.*  
*BMS 504 [2 cr]; BIOT 655 [4 cr]*

### COURSE LEARNING GOALS AND OBJECTIVES

*By the end of this course, students will:*

- (1) Identify and list the experiments utilized to clone phage genes into expression plasmids.
- (2) Explain the science underlying each protocol utilized.
- (3) Effectively record data in an organized and clearly labeled manner (utilizing data cards).
- (4) Organize research materials in a manner required to carry out a multi-step project.
- (5) Orally defend research findings in formal and informal presentations.
- (6) Construct a poster presentation and research paper that analyzes the phage genetics research project data.

Method of Evaluation	Students	Point Value
Benchmarks (2)	504	50
Data Presentation (2)	504	50
Journal Club Participation	504	75
Lab Notebook Checks	504	100
Lab Skills/Lab Citizenship	504	100
WS Poster & Presentation	504	200
Manuscript Drafts/Final Preparation	504	150
Technique Presentations	655	25
p2H protocol development & testing	655	100
Journal Club (leading)	655	75
Benchmark Feedback (2)	655	25
Manuscript Draft 1	655	50
Manuscript Feedback/Final Draft	655	200
<b>Total Points</b>	<b>504/655</b>	<b>725/375</b>

### REQUIRED MATERIALS

### LAB MANUAL

<https://seagenes.helpdocsonline.com/home>

### COURSE PAGE

#### Weekly Modules contain:

- All course materials, including:
  - Syllabus
  - Power Point presentations
  - Handouts
  - Lab content
  - Useful websites

### LAB ESSENTIALS

Lab Coat  
Protective Eyewear  
Laptop Computer

### CONTACT INFO

[kristen.johnson@unh.edu](mailto:kristen.johnson@unh.edu)  
(preferred)  
603-641-4177 (office)

## COURSE REQUIREMENTS and ASSESSMENTS OVERVIEW

- **Daily Preparation / Lab Expectations: Lab Skills & Lab Citizenship (100 pts)**

It is expected that students will read (or view videos) of all background information, lab introductions and protocols prior to the beginning of each lab. In addition, Benchling lab notebook entries (steps 1-3) will be started for each day prior to student entry into lab. Throughout your time in lab, I will take note of your engagement with your classmates and teaching assistants (be an integral team player, not a sideline observer; there are many roles that one can take in each stage of the process), your completion of lab jobs, and your overall improvement in skills as the semester progresses.

- **Data Presentations (25 pts ea)**

Twice during the semester, you will prepare a 5-minute class presentation of your research progress by describing your clearly labeled data on a couple of power point slides.

- **Lab Benchmarks (25 pts ea) / Notebook Checks (50 pts ea)**

I will follow your progress through your online Benchling lab notebook upkeep throughout the semester and formally assess it at 2 points during the semester. More information regarding Benchmarks will be provided in Course Modules. 655 TAs will peer review all Benchmark Data Cards and provide feedback for you to correct prior to each Data Card final submission.

- **Journal Club Presentations / Participation (75 pts)**

Two phage biology research articles will be read and discussed by the class. Presentations and discussion of the articles will be conducted by the instructor/TAs/600-level students (for the first article) and by the entire class (for the second article). 500-level students will be assigned figure annotations and will be expected to fully participate in discussions to receive credit for journal clubs.

- **Technique Presentations (655-only, 25 pts)**

The instructor and TAs will present Phage Genetics techniques being employed this semester through brief PowerPoints at the start of class. The presentation will include historical background of the technique, including the scientific basis for any technology or reagents used and a visual overview of how to conduct the experiment.

- **Final Lab Poster & Presentation (200 pts): week of 12/4**

Team projects are presented at the Winter Symposium through a poster and through an in-class Power point Presentation.

- **G3 Mutant Screen Manuscript Draft and Final Paper Writing (504: 150pts; 655: 250 pts)**

The goal for the end of the semester is to publish the work conducted on the Hoot phage over the past several years. Your class will work together (along with the teaching assistants) drafting the paper and all the data figures, work through editing stages and come up with a final document by the end of the semester that is ready for journal submission.

## COURSE POLICIES

### **Credit Hour Policy**

This syllabus reflects the federal definition of a credit hour, which entails a minimum 3 hours of engaged time per week per credit over a 15-week semester. Examples of engaged time include class time, assignments, examinations, laboratories, participation in course-related experiences (attending a talk or performance, speakers and events, fieldwork, etc.), conferences, and office hours. Student work reflects intended learning outcomes and is verified through evidence of student achievement. For more information, please see: [NECHE policy on Credits and Degrees](#).

### **Academic Honesty**

The Biology/Biotechnology Programs at UNH Manchester will strictly adhere to the [Academic Integrity Policy](#), as published in the UNH Student Rights, Rules, and Responsibilities Handbook. It is imperative that you review this policy to understand the rules and responsibilities about honesty, academic integrity, plagiarism, and cheating. By turning in any piece of work in this course, you declare that you have read and understand the policy, and that you did not engage in any form of academic dishonesty as defined in the Handbook.

*Plagiarism* can take many forms, such as submitting someone else's work - in whole or in part - as your own; collaborating on answers for individual homework assignments or allowing your own work to be used by another student; copying information from a web site or other text without proper documentation; buying a pre-written paper or lab report. *Your assignments submitted through Canvas will be routinely screened for plagiarism and AI use using sophisticated software.* It is strongly recommended that you complete the [Tutorial on Plagiarism](#) in order to fully understand the definition(s) and all forms of it. *Cheating* is mainly concerned with copying on quizzes, exams or in lab, bringing crib notes into an exam or referring to notes or the textbook or any other source such as a programmable calculator, tablet, or cell phone during an exam. All electronic devices must be turned off and placed upside down on the table in front of you for the duration of the exam. Ear buds are not permitted.

Any instances of cheating or plagiarism will result in consequences that can range from a failing grade on the assignment for all students involved to dismissal from the University, as defined in the UNH Student Rights, Rules, and Responsibilities Handbook.

### **AI Tools**

Unless otherwise specified, the use of Automated Writing Tools, including Grammarly, ChatGPT and similar artificial intelligence (AI) tools, is strictly prohibited in this course, even when properly attributed. The use of automated writing tools to complete assignments is considered plagiarism (as defined by UNH's [Academic Integrity Policy](#)) and will be handled in accordance with existing policy.

To avoid concerns or misunderstandings, you're encouraged to:

- Complete all writing assignments using your own ideas and words.
- Turn on version history in Microsoft Word to demonstrate your iterative writing process.
- Ask if you're unsure whether a tool or method is acceptable for a given assignment.

In addition, other uses of AI are prohibited including:

- Using AI to transcribe course lectures
- Uploading course materials to an AI tool for the purposes of summary generation.

### **Attendance**

Class attendance is important for your learning. Attendance in this course is mandatory. You are responsible for all course assignments and meeting all deadlines unless exceptions are agreed upon with the instructor ahead of time. If you need to miss class for a planned activity, let the instructor know ahead of time by email. Attendance will be noted during every lab and lecture section. If you must miss a lecture class for a valid reason (e.g., illness), please contact me (by email in advance) to let me know. Excessive absences (two or more) from the laboratory will result in a reduction in your lab final Benchmark grade (-2% *per absence*). It is your responsibility to get all lecture and lab material to make up what you have missed during any absence. Also, be sure to check MyCourses/Canvas for relevant Power Points, handouts, assignments, etc. See the [Attendance and Class Requirements policy](#) in the SRRR.

If a student needs accommodation for a religious or cultural holiday/observance, that student is encouraged to make that request as early in the semester as possible.

### **Classroom Conduct**

*Cell phones:* Please silence your cell phone before you enter the lab classroom. For this lab, in many cases, you may want to use your phone to document your results. Thus, you may bring it into the lab, but keep it in a secure (CLEAN) location, until you are ready to take the pictures – i.e, you don't want to spill bacteria on it! Thus, keeping it in a zip lock bag is a good idea.

*Computer Use:* You will want your laptop in the lab to document your lab progress in your online lab notebook. Be sure that you are careful to have it off to the side of your working area and that you wipe down computer surfaces prior to leaving the lab.

### **Lab Conduct**

*Food:* There is a strict policy of **NO** food or drinks in the laboratory.

You must wear close-toed shoes, long pants (or long skirt), a lab coat and protective eye wear/goggles always while we are doing experiments in the lab.

## Class Recording Policy

Class lectures and activities will/may be recorded to make this course more accessible, and recordings may be made available to students presently enrolled in the class to assist in reviewing material and preparing for assessments. Recordings are to be used for educational use/purposes only. Students may **not** record class activities (including audio/photographs/screenshots of instructors and students) without express permission from their instructor and students whose image is captured. If permission is granted, student-initiated recordings may only be used for educational purposes in this class and only during the period in which the student is enrolled in the class; authorized student-initiated recordings may **not** be posted or shared in any fashion outside of the class.

## COURSE/CAMPUS & LEARNING RESOURCES

### Student Resources

UNH provides a variety of resources to support students' academic success, health and well-being, and engagement with the campus community. A list of student resources can be found on the Provost's website. These resources are not required for this course but may be helpful to you during the semester.

### Peer Tutoring Course Support

Knack is a peer-to-peer tutoring platform that is available to all enrolled students for all undergraduate courses in Durham and Manchester at no cost to students. Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. UNH has partnered with Knack to provide students with access to verified tutors who have successfully completed your course. To view available tutors, visit [unh.joinknack.com](http://unh.joinknack.com) and sign in with your student account.

### Connors Writing Center and Online Writing Lab

#### *Connors Writing Center (CWC)*

The [Connors Writing Center](#) offers one-on-one writing conferences to current UNH students (undergraduate and graduate). We work with writers from all disciplines on many kinds of writing. Our conferences are conducted by trained writing assistants who are UNH undergraduate and graduate students.

The CWC offers both in-person and virtual appointments, available to any current UNH student. The online sessions are synchronous (real-time) appointments designed to help students have one-on-one conversations about their writing at any stage of the process, mirroring what we do during in-person appointments. **Students can schedule an appointment any time during the semester.**

#### *Online Writing Lab (OWL)*

The [Online Writing Lab \(OWL\)](#) assists students via asynchronous remote collaboration with qualified writing assistants. The OWL is not an editing or manuscript preparation service. Feedback may include reference to mechanics on the submitted paper, but it will be targeted to bring attention to patterns and issues to help the writer self-correct the paper and carry forward lessons to improve future writing.

Students in all fields of study can submit up to 20 double-spaced pages of any form of writing, including course papers, resumes, creative essays, or personal statements. Within 3 business days, writing assistants provide feedback that can be printed or viewed on screen. The OWL is accessible through any computer that has an Internet connection and Microsoft Word.

**To submit a paper, students can sign in at [unh.mywconline.com](http://unh.mywconline.com) and select the "Online Writing Lab" schedule.**

The UNH Manchester librarians are available to assist you with the research process. Visit the library's website at <https://cps.unh.edu/library> to learn about library services and to search for reliable academic sources. You can contact the library at 603-641-4173 or at [unhm.library@unh.edu](mailto:unhm.library@unh.edu).

### Library Resources

The links below guide you to useful online library resources:

- Make a Research Appointment with a librarian: <https://libraryguides.unh.edu/remotearchive/researchhelp>
- Use the Library Search Box to find information:  
[https://libraryguides.unh.edu/librarysearchbox\\_unhmanchester](https://libraryguides.unh.edu/librarysearchbox_unhmanchester)
- Reserve a Study Room: <https://cps.unh.edu/library/support-services>
- Discover resources for Citing Sources: <https://libraryguides.unh.edu/unhmcitingsources>
- Learn strategies for Evaluating Sources:  
<https://libraryguides.unh.edu/ENGL401UNHManchester/evaluatingresources>.

### Accessibility Services

According to the Americans with Disabilities Act (as amended, 2008), each student with a disability has the right to request services from UNH to accommodate his/her/their disability. If you are a student with a documented disability or believe you may have a disability that requires accommodations, please contact Student Accessibility Services (SAS) located on the Manchester campus in room 417 or [sas.office@unh.edu](mailto:sas.office@unh.edu).

Accommodation letters are created by SAS with the student. Please follow-up with your instructor as soon as possible to ensure timely implementation of the identified accommodations in the letter. Faculty have an obligation to respond once they receive official notice of accommodations from SAS but are under no obligation to provide retroactive accommodations. For more information refer to [www.unh.edu/sas](http://www.unh.edu/sas) or contact SAS at 603.862.2607, 711 (Relay NH) or [sas.office@unh.edu](mailto:sas.office@unh.edu).

### Curtailed Operations

If the university curtails operations due to weather, we will not hold in-person activities for our safety and the safety of others. As soon as possible, I will post an announcement on Canvas about due dates, any make-up work, and (*if applicable*) any online options that may make sense depending on where we are in the course. Please make sure you have access to the UNH Alert RAVE system. If needed, sign up for RAVE Alerts [here](#).

### Temporary Academic Supports for Extended Absences with Letter

If you are dealing with an unexpected, extenuating circumstance that will keep you out of class or affect your performance for more than a day or two, reach out to Lisa Enright, Assistant Dean of Student Success, at [lisa.enright@unh.edu](mailto:lisa.enright@unh.edu) to request a letter be sent to all your faculty.

If you are required to miss significant class time, you will be provided temporary academic supports so that you can continue to make satisfactory progress in this course. Please contact your course instructor to discuss the specific types of supports that will be implemented during your absence, including:

- Class notes from a peer
- One-on-one meetings during office hours with instructor or TA to catch-up on missed content
- Lecture slides
- Handouts or other materials that are distributed

### Food Pantry

The UNH Manchester Food Pantry, located in room 437 is open Monday through Friday from 8:00am- 9:30pm. Any UNH Manchester community member can take what they need. If you have any questions, please email [UNHM.Foodpantry@unh.edu](mailto:UNHM.Foodpantry@unh.edu)

### Emotional or mental health distress

In partnership with The Mental Health Center of Greater Manchester, UNH Manchester offers consultation visits on a walk-in basis and through telehealth appointments.

Services include:

- Free confidential screening & consultation with a licensed mental health therapist.
- Referrals to mental health or substance misuse treatment. And assistance in understanding how to afford additional treatment (with or without insurance!) or find free services.

**You may email:** [unhm.wellness@unh.edu](mailto:unhm.wellness@unh.edu) to make an appointment to meet with a counselor by clicking [here](#).

If you would like to connect to counseling services directly, you may do so by contacting The Greater Manchester Mental Health Center at (603) 668 - 4111.

### Confidentiality and Mandatory Reporting of Sexual Violence or Harassment

The University of New Hampshire and its faculty are committed to assuring a safe and productive educational environment for all students and for the university as a whole. To this end, the university requires faculty members to report to the university's Title IX Coordinator (Bo Zaryckyj, [Bo.Zaryckyj@unh.edu](mailto:Bo.Zaryckyj@unh.edu), 603-862-2930/1527 TTY). Faculty, staff or students on the Manchester campus can also contact Lisa Enright, Deputy Title IX Coordinator ([lisa.enright@unh.edu](mailto:lisa.enright@unh.edu); 603-641-4336; Room 439) to report any incidents of sexual violence and harassment shared by students.

If you wish to speak to a confidential support service provider who does not have this reporting responsibility because their

discussions with clients are subject to legal privilege, you can contact the SHARPP Center for Interpersonal Violence Awareness, Prevention, and Advocacy at (603) 862-7233/TTY (800) 735-2964, as well as, Caroline Young, SHARRP Center Advocacy Expanded Services Coordinator for UNH Manchester ([caroline.young1@unh.edu](mailto:caroline.young1@unh.edu); room 417; Available in person Mondays 9 am to 4-pm and available by appointment (in person and virtually) by emailing [caroline.young1@unh.edu](mailto:caroline.young1@unh.edu) ). Individuals can also access Reach Crisis Services NH 603-668-2299 (24 hours), 77 Sundial Ave., Suite 306W, Manchester, NH.

For more information about what happens when you report, how the university treats your information once a report is made to the Title IX Coordinator, your rights and reporting options at UNH (including anonymous reporting options) please visit [student reporting options](#) . The uSafeUS app is also available for students to keep reporting options and resources easily accessible on their phones.

Help us improve our campus and community climate. If you have observed or experienced an incident of bias, discrimination or harassment, please report the incident by contacting the Civil Rights & Equity Office at [UNH.civilrights@unh.edu](mailto:UNH.civilrights@unh.edu) or TEL # (603) 862-2930 voice/ (603) 862-1527 TTY / 7-1-1 Relay NH, or visit the CREO website. Anonymous reports may be submitted.

#### Confidential Support Resources for UNH Manchester:

- SHARPP Extended Services Coordinator for UNH Manchester- room 417. Available in person Mondays 9 am to 4-pm and by Zoom appointment year-round M-F.
- YWCA, NH – 603-668-2299(24hour), 72 Concord St. Manchester, NH
- The Mental Health Center of Greater Manchester: On campus mental health counselors are available by appointment during the academic year. Located in room 426.
- 24 Hour NH Sexual Violence Hotline: 1-800-277-5570
- 24 Hour NH Domestic Violence Hotline: 1-866-644-3574



## (Advanced) Phage Genetics Lab Course Schedule / Research Pacing

Course Meetings: 26 total and final lab day

Week of... (# class mtgs)	Lab Activities	Assignment/Assessment
Aug 25 (2)	Introduction to GENES Project	Benchling lab notebook set up
Sept 1 (1)	Prep of Plasmids for Sequencing	Sequence Analysis Report Presentation
Sept 8 (2)	Sequencing Reactions / Analysis	<b>Journal Club I</b>
Sept 15 (2)	Phenotyping with Cytotoxicity Assay  <b>Benchmark 1: Cytotoxicity Data Cards</b>	<i>Presentation of electroporation technique and cytotoxicity assay</i>
Sept 22 (2)		
Sept 29 (2)		
Oct 6 (2)		G3 Mutant Screen Manuscript Draft 1 <b>Cytotox Data Presentation;</b>
Oct 13 (1)		<b>Lab Notebook Check I</b>
Oct 20 (2)	B2H Interaction Assay  <b>Benchmark 2: B2H Data Card</b>	<i>Presentation of cloning cytotoxic genes into p2Ha</i>
Oct 27 (2)		
Nov 3 (1)		
Nov 10 (2)		G3 Mutant Screen Manuscript Draft 2
Nov 17 (2)		<b>Journal Club II</b>
Nov 24 (1)	Poster Presentations / Paper Work	<b>Final Poster Due (11/24)</b>
Dec 1 (2)	In class Paper Work	G3 Mutant Screen Manuscript Final Draft <b>Lab Notebook Check II</b> Winter Symposium Poster Presentation (Dec 4)
Dec 11 (1)	Lab Clean-up; Archiving; Final Data Summary Due	

*Note: Above course schedule is subject to change! Any changes will be communicated by the instructor to the students by email as soon as possible.*

**GRADING SCALE: Final grades in this course will be based on the following scale:**

<i>A</i> 92.6 -100	<i>A-</i> 89.6 – 92.5	<i>B+</i> 86.6 – 89.5
<i>B</i> 82.6 – 86.5	<i>B-</i> 79.6 – 82.5	<i>C+</i> 76.6 – 79.5
<i>C</i> 72.6 – 76.5	<i>C-</i> 69.6 – 72.5	<i>D+</i> 66.6 – 69.5
<i>D</i> 62.6 – 66.5	<i>D-</i> 60 – 62.5	<i>F</i> < 60