

Viral Genomes Lab Syllabus

Fall 2021

Course ID: BIOSC 0067

Section 1010 (CRN: 20710) Monday 8:30 am – 11:20 pm G13 Clapp Hall

Section 1015 (CRN: 23625) Monday 12:00 pm – 2:50 pm G13 Clapp Hall

INSTRUCTOR INFORMATION

Marcie Warner, Ph.D.
mwarner1@pitt.edu

The best way to contact me is via email; I will typically respond to your emails within 24 hours.

IMPORTANT STATEMENT ON MASKS:

Under current University guidance, masks are required for all persons, regardless of vaccination status, in University of Pittsburgh facilities unless you have a valid exemption filed with the Office for Disability Resources and Services and your instructor has been notified of this exemption.

- Do not enter the classroom without a mask
- If you enter without a mask or wear a mask improperly (not covering mouth AND nose) at any time during class, you will be asked once to correct this oversight.
- Any future violations of the University mask policy will result in you being removed from class and receiving an unexcused absence.

OFFICE HOURS

All office hours will be held on Zoom. If you want to attend office hours, click on the link to join. If I am meeting with another student, you will be placed in the waiting room, and you will be admitted when the previous student is finished. Email me to set up another meeting time if the scheduled times for office hours do not fit your schedule.

Office hours: Thursday 10 am – 12 pm

Zoom meeting link: <https://pitt.zoom.us/j/93388936370>

Meeting ID: 933 8893 6370

PRE-REQUISITES

Minimum grade of C or higher in:

Biosc 0050 or 0058 or 0070 or 0190 or Biol 0101 or 0111

Co-requisites:

Biosc 0160 or 0180 or 0165 or 0716 or Biol 0102 or 0120 or Bioeng 1071 or 1072

EXPERIMENTAL OVERVIEW

In order to learn about how a novel virus is evaluated for gene content and phylogeny, you will work with a team of other students to “annotate” a bacteriophage genome. Your group will begin the semester with a raw file of nucleotide sequence (on average, a phage genome contains about 70,000 nucleotides). You will utilize a suite of bioinformatics programs to evaluate how many genes the phage contains, where those genes are positioned along the genome, and how many of those genes can be assigned functions. Your completed annotation will be submitted to the Genbank database and you will be an author on the file; your work will then be publicly available to phage researchers to aid in their future analyses. You will end the semester by performing an independent project to further investigate the effects of viral mutations or investigate their life cycle or host range.

COURSE OBJECTIVES

Upon completion of this course, the student will be able to:

- Explain how a novel virus is identified and characterized
- Utilize a suite of bioinformatics programs to evaluate the likelihood that a stretch of viral DNA might be expressed and/or translated and what the function of the gene product might be
- Perform comparative analyses to evaluate the novelty of a viral genome
- Broadly understand the theory behind several bioinformatics programs
- Read, record, and present primary scientific data

REQUIRED MATERIALS

You do not need to purchase any textbooks or other materials prior to the start of the semester; all tools are provided with your university login credentials to my.pitt.edu or on the indicated websites.

All **Assignment instructions** will be posted to Canvas

HHMI SEA-PHAGES **Bioinformatics Guide:**

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

Step-by-step phage annotation instructions

HHMI SEA-PHAGES **Phage Discovery Guide:**

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

Useful for readings on background phage information

Actinobacteriophage Database:

<https://phagesdb.org/>

Links to **GeneMark** on phage page

Phamerator:

<https://phamerator.org/>

Phage genome visualization/comparative program

PECAAN:

<https://discover.kbrinsgd.org/evidence/summary>

Tool for compiling output from bioinformatics programs and final genome calls

It is important that you know how to get on Canvas: <http://canvas.pitt.edu/>. You can access Canvas from my.pitt.edu Student Portal, or you can download the Canvas mobile app. You are expected to check Canvas regularly for lecture notes, assignments, announcements, and other material. Main communication with the class will be via Canvas announcements. All assignments will be submitted through Canvas, and grades/corresponding rubrics will be posted to Canvas. If you need help accessing Canvas, contact computer help desk at 412-624-HELP or click on the Help icon on your Canvas dashboard. Assistance is available 24/7 by phone, email, or webchat.

COURSE EVALUATION

See **weekly modules** in the Canvas course navigation menu for detailed instructions for each individual assignment.

EVALUATION

Item Evaluated	Method of Completion	Due at Start of Class on:	Point Value	Percentage of Final Grade
Canvas Quizzes	Individual	18 point weekly quiz during phage annotation (6 total; drop lowest)	90	30%
Research papers				10%
Chan paper	Individual	Sept 13	15	
Hatfull/Spencer paper	Individual	Nov 1	15	
Annotation				45%
Coding potential	Individual	Sept 20	20	
BLAST	Individual	Sept 27	20	
Start tools	Individual	Oct 4	20	
Final start calls	Team	Oct 18	15	
Function tools	Individual	Oct 18	20	
Final function calls	Team	Oct 25	15	
Guiding principles analysis	Team	Oct 25	20	
Author list	Individual	Oct 25	5	
Final Project				15%
Choice of final project	Team	Nov 3	2	
Slideshow of annotation + independent project results	Team	Dec 6	30	
Oral presentation	Team	Dec 6	10	
Evaluation of other students' presentations	Individual	Dec 13	3	
		TOTAL	300	

GRADING SCALE

Percentages are rounded to the nearest number, so 97.4% = 97% and 97.5% = 98%.

Grade	Points
A+	97 - 100
A	93 - < 97
A-	90 - < 93
B+	87 - < 90
B	83 - < 87
B-	80 - < 83
C+	77 - < 80

Grade	Points
C	73 - < 77
C-	70 - < 73
D+	67 - < 70
D	63 - < 67
D-	60 - < 63
F	Less than 60

COURSE SCHEDULE

This schedule is subject to change to accommodate the progress of course research. Students will be notified of any schedule changes in the weekly Canvas announcement.

- Week 1 (August 30):
 - Review viral structure and classification
 - Discuss bacteriophages and genome annotation
- Week 2 (Sept 6):
 - **NO CLASS (Labor Day)**
- Week 3 (Sept 13):
 - Review initial discovery and classification of SARS-CoV-2
 - Review details of the phage we're annotating
 - Utilize GeneMark to evaluate coding potential of predicted phage genes
- Week 4 (Sept 20):
 - Perform BLAST analyses of predicted genes
- Week 5 (Sept 27):
 - Evaluate Starterator data
 - Evaluate gap/overlap data
- Week 6 (Oct 4):
 - Make final start calls
 - Evaluate and/or confirm functional assignments using HHPred

- Week 7 (Oct 11)
- NO CLASS – Fall break
- Week 8 (Oct 18):
- Make final function calls
- Discuss guiding principles
- Week 9 (Oct 25):
- Finalize annotation and submit
- Week 10 (Nov 1):
- Introduce final projects
- Practice micropipetting/titer lysates/streak for lysogens
- Week 11 (Nov 8):
- Begin final project experiments
- Week 12 (Nov 15)
- Continue work on final projects/collect data
- Week 13 (Nov 22):
- NO CLASS (Thanksgiving)
- Week 14 (Nov 29):
- Finish final projects/collect data
- Prepare presentations and record
- Week 15 (Dec 6):
- Watch classmates' presentations and presentations from other courses

TEACHING METHODS

BIOSC 0067 is an authentic, research-based lab course in which students will work individually and in teams to annotate the genome of a novel bacteriophage infecting *Gordonia terrae* and to use a variety of bioinformatic tools to investigate the SARS CoV-2 virus.

Class activities (journal article discussions, bioinformatics data analysis, presentations) will enrich students' understanding of the field and improve their scientific identity.

E-MAIL COMMUNICATION POLICY

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on *Edit Forwarding Addresses*, and follow the instructions on the page. Be sure to log out of your account when you have finished. For the full E-mail Communication Policy, go to www.bc.pitt.edu/policies/policy/09/09-10-01.html.)

RECORDINGS

Lab meetings (not including individual group discussions) will be recorded on Zoom for students to review the material or to catch up in the event of an absence. These recordings will be available on Canvas and are only for use by students in this section during this term. At the end of the term, recordings will be deleted.

COURSE ATTENDANCE POLICY

A significant portion of most class meetings will be dedicated to group work and preparation for student presentations. You will need to arrange a weekly meeting with your group if you are unable to meet during class time, a meeting with the instructor to make up any in-class presentations and view the recorded lecture prior to the next week's class.

If you are unable to attend class for any reason, please contact both your section instructor and all members of your Research Team as soon as possible, preferably prior to the start of class. Given that we are holding meetings for class in the middle of a pandemic, it is expected that other members of the Research Team will take on a reasonable amount of additional teamwork until the sick teammate recovers. When the teammate is able to return to class, it is expected that the returning teammate will relieve the other team members and assume extra duties during the next lab.

Any absence must be properly excused by a healthcare provider OR Pitt Student Health for an illness or a University official for University business. Excused absences are at the discretion of your instructor, although most absences may count as excused if you keep in regular communication with your instructor and demonstrate a reasonable effort to make progress in the course. Acceptable documentation should be submitted to your instructor via email within

one week of the missed class or it will not be accepted. The penalties for unexcused absences are as follows:

1 unexcused absence	Deduction of ½ letter grade from final grade
2 unexcused absences	Deduction of one full letter grade from final grade
3 unexcused absences	Failure for class (if withdrawal option not taken)

If you need to miss class on a regular basis for an excused reason, please speak with your section instructor right away to make arrangements to move to another section that better meets your needs.

Arriving to class late (more than 15 minutes after class has started) will result in a deduction of 3 points per late arrival from the final course grade. Missing the start of a class (more than 30 minutes) counts as missing the entire class. Being absent from lab does not change assignment due dates, although extensions can be granted at the instructor's discretion.

PLAGIARISM & ACADEMIC INTEGRITY

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands-on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

DISABILITY SERVICES

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services \(DRS\)](#), 140 William Pitt Union, (412) 648- 7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

HEALTH AND SAFETY STATEMENT

In the midst of this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. While in class, at a minimum this means that you must wear a face covering (mouth and nose must be covered at all times) and comply with current University guidance; other requirements may be added by

the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

ACCESSIBILITY

The Canvas LMS platform was built using the most modern HTML and CSS technologies, and is committed to W3C's Web Accessibility Initiative and [Section 508](#) guidelines. Specific details regarding individual [feature compliance](#) are documented and updated regularly.

DIVERSITY AND INCLUSION

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: <http://diversity.pitt.edu/affirmativeaction/policies-procedures-and-practices>.

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be filed online:

<https://www.diversity.pitt.edu/make-report/report-form>. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

COPYRIGHT NOTICE

These materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. [See Library of Congress Copyright Office](#) and the [University Copyright Policy](#).

RELIGIOUS OBSERVANCES

The observance of religious holidays (activities observed by a religious group of which a student is a member) and cultural practices are an important reflection of diversity. As your instructor, I am committed to providing equivalent educational opportunities to students of all belief

systems. At the beginning of the semester, you should review the course requirements to identify foreseeable conflicts with assignments, exams, or other required attendance. If at all possible, please contact me within the first two weeks of the first class meeting to allow time for us to discuss and make fair and reasonable adjustments to the schedule and/or tasks.

GENDER INCLUSIVE LANGUAGE STATEMENT

Language is gender-inclusive and non-sexist when we use words that affirm and respect how people describe, express, and experience their gender. Just as sexist language excludes women's experiences, non-gender-inclusive language excludes the experiences of individuals whose identities may not fit the gender binary, and/or who may not identify with the sex they were assigned at birth. Identities including trans, intersex, and genderqueer reflect personal descriptions, expressions, and experiences. Gender-inclusive/non-sexist language acknowledges people of any gender (for example, first year student versus freshman, chair versus chairman, humankind versus mankind, etc.). It also affirms non-binary gender identifications, and recognizes the difference between biological sex and gender expression. Students, faculty, and staff may share their preferred pronouns and names, and these gender identities and gender expressions should be honored.

TAKE CARE OF YOURSELF

College can be an exciting and challenging time for students. Taking time to care for yourself and seeking appropriate support can help you achieve your academic and professional goals. You are encouraged to maintain a healthy lifestyle by eating a balanced diet, exercising regularly, avoiding drugs and alcohol, getting enough sleep, and taking time to relax.

It can be helpful to remember that we all benefit from assistance and guidance at times, and there are many resources available to support your well-being while you are at Pitt. If you or anyone you know experiences overwhelming academic stress, persistent difficult feelings and/or challenging life events, you are strongly encouraged to seek support. In addition to reaching out to friends and loved ones, consider connecting with a faculty member you trust for assistance connecting to helpful resources.

The [University Counseling Center](#) is also here for you. You can call 412-648-7930 at any time to connect with a clinician.

If you or someone you know is feeling suicidal, call someone immediately, day or night:
University Counseling Center (UCC): 412 648-7930
University Counseling Center Mental Health Crisis Response: 412-648-7930 x1
Resolve Crisis Network: 888-796-8226 (888-7-YOU-CAN)

If the situation is life threatening, call the Police:

On-campus: Pitt Police: 412-268-2121
Off-campus: 911