BIOSC 1740: VIROLOGY LAB
Department of Biological Sciences
University of Pittsburgh

Faculty & Staff
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Meeting Times
Tues/Thurs: 4:00 – 5:50 pm in G5 Clapp Hall

Office Hours
By appointment – send an email to your instructor specifying 2-3 times you can meet and check back for the reply/confirmation of the appointment.

Introduction
This 1 credit laboratory course will introduce you to techniques and methods used in studying viruses that infect bacteria, which you will practice and apply in the process of scientific inquiry by conducting research in the field of virology. Pre-requisites are the Microbiology lecture (BIOSC 1850), Genetics, and Introductory or General Microbiology lab courses (BIOSC 1855 or 1860). The Virology lecture (BIOSC 1730) is not a requirement for the laboratory and will not be coordinated with the lab experiments.

Course Description & Organization
This course will introduce you to techniques involving bacteriophages (phage). While eukaryotic cell culture techniques will not be taught, the assays and techniques learned using phage are directly transferable to the laboratory study of eukaryotic viruses. This semester, the class will investigate immunity mechanisms in mycobacteriophage, generating original research and data alongside the Hatfull lab.

Most of the time, you will be conducting two or more experiments at once. This is standard practice in microbiology since inoculation occurs in the first period and the results can be interpreted in the subsequent periods after the culture has grown. The coursework is grouped into the following portions:

- Isolate phage mutants that escape resistance and immunity mechanisms
- Design and execute a phage-based group project, culminating in a poster session at the end of the semester

The initial schedule of phage experiments has been posted on CourseWeb. This detailed schedule is a vision of the path this course could take, but we will inevitably deviate from it as we are working with (sometimes fickle) living microorganisms and science never works as planned. As virologists, and scientists in general, you will receive valuable lessons in frustration, flexibility, and trouble-shooting! Changes to the schedule will be announced to you and posted on CW as soon as they are known.

Course Material and CourseWeb
CourseWeb will be used to post notes on laboratory instrumentation and experimental protocols, announcements, and other additional material. You are expected to check here regularly.

Materials needed for the class will be uploaded onto CourseWeb. You are responsible for bringing copies (printed or digital) of all relevant protocols to class, as specified by the
There is no textbook for the course. Protocols and references will be uploaded or linked on CourseWeb. The majority of protocols will be from the Phage Discovery Guide (Poxleitner, Pope, Jacobs-Sera, Sivanathan, and Hatfull, 2016), which will be uploaded as a whole and as selected protocols.

**Note:** It is necessary for you to realize that in using these sources you may not perform an experiment exactly as it appears in your texts. Use these sources as you would a cookbook: the source provides a recipe that you adapt to your own needs. If you are considering a career in laboratory biology, it is essential for you to become comfortable with this approach to experimental protocols. The lack of published procedures that are specifically designed for your own needs is a situation you will encounter frequently as you pursue your careers. Learning to use protocols thoughtfully and imaginatively is part of your preparation for such careers, and class sessions will focus on this skill.

We will utilize the electronic lab notebook software “Lab Archives”. A laboratory notebook maintains an accurate record of your experimentation. As a research lab, it is very important that someone could open your notebook in a month or a year and be able to follow your work and possibly replicate individual experiments. As a teaching lab, it is important that you develop the skills necessary to prepare for experimentation, as well as to keep an accurate notebook. It is very important that you prepare entries prior to lab so that the entirety of lab time is used for experimentation and data collection.

Lab Archives is accessible through any browser, tablet, or smartphone. You will receive an email to join our class section and you will find a link to the Lab Archives site on your My Pitt homepage. Students should bring their own device to class to make entries, read protocols, etc. A limited number of tablets and/or laptops are available to borrow in class for students that do not have their own device. Please contact your instructor immediately if you need to borrow a device on a regular basis. Alternatively, students are welcome to print out entries from their notebook and bring these to class to follow protocols from, but please note: All data and analysis must go into the electronic notebooks immediately after each class. Notebooks will be assessed on an individual basis as well as by group for the final projects.

Good laboratory work develops as a combination of many different skills. If you are better at the lab bench than at written exams, we want your grade to give you credit for that. Consequently, our evaluation of your coursework will proceed at several levels.

**Preparation for class:** It is crucial that you are coming to the laboratory having read the day’s protocol(s) BEFORE entering the room. If you don't do this, you will work unsafely and inefficiently and are likely to make major mistakes in your work. To this end, you will be updating your electronic lab notebook with protocols prior to each class.

**Examinations:** There will be one written exam midway through the semester and a Final exam (TBD), which will be cumulative. Notes are not permitted for the exams. Only if you provide documentation for an acceptable excuse for missing an exam will you be allowed to take a make-up exam. Documentation must be presented within one week of the missed exam and prior to the exam is preferred. Make-up exams may be a combination of written and oral parts.

**Practical examinations:** There will be at least one practical exam focused on basic phage techniques such as plaque assays and serial dilutions. Dates will be announced two weeks
prior to the exam, and details including rubrics will be available beforehand on CourseWeb.

**Lab Notebook:** You will be keeping an individual and group electronic lab notebook throughout the semester. All individual entries will be checked for timely submission, and some may be graded more specifically. Some assignments may require filling out lab notebook entries or replying to other groups’ entries.

**Laboratory work assignments:** On specific occasions, you may be required to submit materials, experimental results and analyses of experiments performed in class. Not all assignments will be graded numerically, and those that are assigned a score will be clarified prior to submission. These may also include pre-labs, post-labs, and in-class or at-home quizzes.

**Poster presentations:** In consultation with the instructor, groups of 3 students will work together on a research project. The poster presentation will be a compilation of the experiments, data, results, and conclusions from the semester long project. The poster presentation grade will also include the quality of your group lab notebook, general laboratory competence and engagement, and any oral presentations.

**Oral presentations:** There will be a planned, formal presentation dealing with your special project that will serve as a forum for feedback to refine your experimental design. There may also be informal, impromptu oral presentations focusing either on some topic from the course experiments or on some preliminary work on your special project.

**Late Submissions:** Please be aware that, unless otherwise noted, late submissions of written and/or culture materials will be assessed a 50% penalty, *i.e.*, a late but perfect submission can earn only half the maximum points.

**Necessary adjustments:** BIOSC 1740 will give you a real research experience. As a consequence, inevitably there will be modifications to the schedule of experiments that may lead to adjustments in the grading criteria. You will be apprised of any changes in student evaluations in a timely manner. Please be aware that we strive to make sure that all of your assessments will be fair and true reflections of your performance and competence.

**Course Grade**

The grade will be approximately as follows (and adjusted with notice as needed):

- Special Projects (inc. oral and poster presentations and group notebooks)... 35%
- Practical Exam(s) ......................................................... 15%
- Individual Lab Notebooks, Materials, and Assignments ...................... 20%
- Written Exams and Quizzes (including Final) .................................. 25%
- Competence Points (see *Consequences*) ........................................ 5%

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Historically, final grades fall on the following grading scale. HOWEVER, final grades are NOT constricted to these requirements. Your final grade is at your instructor's discretion.
Please note:
- Grades are a reflection of the quality of your performance in this class. Grades are not a reward for effort or perfect attendance.
- As the semester progresses, we expect you to improve in your bench skills, and in your competency with reading and following a protocol. We will give you feedback, but you should develop independence and self-analysis.
- You are responsible for submitting complete assignments and pre/post lab assignments that follow the guidelines and instructions.
- You are responsible for preparing for the practical and written exams.

Each student will conduct him/herself in a manner that is necessary for future professional success. This includes but is not limited to: attendance and arrival on-time, timely completion of assignments, good time management within the lab and perseverance toward project goals, adherence to safety protocols including appropriate attire, participation in lab, and timely communication with instructors about any issues inside or outside of the classroom that may affect student performance.

As in all aspects of life, there are consequences for your actions. When you are employed in the healthcare and/or science field the consequences for inappropriate actions can be severe. A patient may get sick or sicker; you may get sick; a colleague may get injured; you may get fired.

The laboratory techniques and behaviors that you learn and practice in this class will be carried forward into your professional life. You will be given instruction and guidelines on many microbiological and clinical techniques and procedures. You are expected to pay careful attention to the instruction, and to practice the techniques and procedures. The instruction and practice are designed to keep you, your classmates, your instructors, and your future patients and colleagues safe.

You will start the semester with 10 Competence Points. If you are attentive and careful, you will keep all of your competence points. Competence points will be subtracted for violations of any safety procedure. This includes, but is not limited to, improper aseptic technique, incorrect waste disposal (see the separate document dealing with proper waste disposal). You will lose competence points if you are inattentive to protocol details; this results in contaminated strains, useless experimental results, waste of reagents and other experimental materials. You will also lose competence points if you do not learn and practice proper care and use of the laboratory equipment, including, but not limited to, the microscopes and micropipettors. You will lose competence points for violations of classroom etiquette and behavior such as improper care and use of classroom supplies, media and solutions, as well as glass and plastic ware. Repeated offenses will incur higher point losses.

Plagiarism

Plagiarism is a serious offense that will not be tolerated in this class or at the University. If plagiarism is seen, points will be deducted immediately and cannot be earned back. Any plagiarism will result in partial or full loss of points for the document where the plagiarism occurred. If the issue continues, the offenses will be brought up to the Chair of the Biological Sciences, Paula Grabowski, the Director of Undergraduate Programs, Valerie Oke, and the Dean of Students.

For an explanation of what plagiarism is, please visit the website: plagiarism.org. For anything you look up for any class work, cite your references and use your own words! This also includes the class textbook and materials posted on CourseWeb.
Final Exam Conflict
Visit the Course Policies in CourseWeb for the University’s guidelines and forms. Please speak with your instructor immediately since there are university deadlines for final exam conflict resolution.

Contesting a Grade
If you wish to contest a grade for any material that is evaluated in this course, you may do so by submitting your request in writing and explaining why you think the grading was in error. You must include a detailed justification for the correctness of your answer, including references to the text used in the course (text, page, paragraph), unless the re-grade is due to an addition error. This request must be submitted to the instructor within one week from the return of the materials. Please be aware that the entire document may/will be re-graded.

Late Add Policy
Since experimentation and other class activities start on the first day of class, if you add the class during the Add/Drop period, you will have missed important course work. Be aware that you are responsible for catching up and completing any missed work. The deadlines for any project-associated work and submissions will not be extended. There are no opportunities for make-up lab time or missed assessments. Your instructor will be as accommodating as possible to meet with you outside of your normal class time; this arrangement must be initiated by you.

Absences
• If you aren’t certain whether your reason for an absence will meet our guidelines, please ask. We try to be as accommodating as we can while still treating everyone fairly. Any need for absence from a practical/exam or request for extra time on an assignment must be documented.

• If you miss any classes or work due to a mental health issue, we do ask for documentation so we can accommodate you as best as we can for each instance. A great resource for students is the University Counseling Center and the services provided are free of charge. It offers a variety of mental health services to students utilizing a short-term, time limited approach, including assessment, counseling and psychotherapy services (individual, group, and couples), and psychiatric services. Their website is: www.studentaffairs.pitt.edu/cc

• If you miss a practical/exam and are permitted to take a makeup, the makeup may not be of the same kind as the practical/exam taken by the class. For example, it could be composed of essay questions instead of short answers or it might be an oral exam.

• If you will be unable to attend any day that material is scheduled, we may or may not be able to arrange for you to make up the work, depending on what experiments are involved. Some class materials are unstable and complicated to prepare and we may not be able to make them available at additional times.

• Absences will not excuse you from not being responsible for the material missed for assignments, practical exams, or other examinations.

• Since the background and introductory material is usually presented at the start of the lab session, missing the start of a class counts as a minimum of one half of the class period missed.

  o If you arrive late, you will be allowed to participate in the day’s class only at the discretion of the instructor.

  o If your tardiness results in a safety concern and/or an undue instructional burden, you will not be allowed to attend class on that day. In such a case, it will be your responsibility to arrange for a time to make up the work.
• Office hours are intended for meetings with instructors for help and discussion on experiments; they are not to be used for making up missed work!

• If you miss a class because of an emergency, please let us know as soon as you can. Please call (or ask someone else to call), or send an email to your instructor. The preferable contact method is by email.

• It is unlikely that a single unexcused absence will have much effect on your grade. Keep in mind however, that an unexcused absence is unacceptable and impossible to overlook. Any incomplete lab exercise will affect your grade.

• Missing more than 10% of the laboratory periods will result in a failing grade (‘F’) even if the absences are excused and no matter how well you do on the examinations and assignments.

Retention of Materials

The instructor will not keep any course materials (exams, notebooks, assignments) beyond four weeks after the close of the term. If you wish to have any course materials returned to you, please contact the instructor before the time period ends.

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity, and Dietrich School of Arts and Sciences 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.

Student Conduct

In keeping with the University of Pittsburgh Student Code of Conduct, all students are expected to behave as respectful and civil members of the university community. All instructors and students will act in a considerate manner in order to create and maintain a classroom atmosphere that is conducive to learning. In addition to being unacceptable on the grounds of common decency, disruptive and disrespectful behavior contributes to unsafe working conditions.

• Disruptive and disrespectful behavior will not be tolerated. Examples of disruptive behavior include, but are not limited to, repeated tardiness, texting in class, speaking or acting in any sexually, racially, or ethnically harassing manner, cheating, misuse and abuse of laboratory equipment and material, disregard of any safety guidelines. Disruptive students will be referred to the Office of Student Conduct for mediation, discipline, or both.

Email Communication Policy

Each student is issued a University e-mail address (username@pitt.edu) upon admittance to 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
Disability Services

If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the second week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call (412) 648-7890 (Voice or TTD) to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union on the Oakland campus.

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.

Accessibility

Blackboard is ADA Compliant and has fully implemented the final accessibility standards for electronic and information technology covered by Section 508 of the Rehabilitation Act Amendments of 1998. Please note that, due to the flexibility provided in this product, it is possible for some material to inadvertently fall outside of these guidelines.

Recording Statement

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.

Waste Disposal Guidelines

Soft Waste

- Dispose of ALL paper and soft waste, such as KimWipes and Optik Wipes, in the plastic cylinders labeled “soft waste” located on the bench.
- When discarding contaminated plastic pipettes, slip them back into the paper sleeve and dispose in the designated bench top biohazard container.
- All used, contaminated toothpicks should be discarded in the designated bench top biohazard container. Any unused toothpicks in containers should be placed on the waste bench for re-autoclaving.

Glass Waste

- All broken glass is to be discarded in the broken glass boxes. There are small boxes located at each bench as well as a large box by the easel.
- All used glass slides, including staining slides with bacteria, should be discarded in the broken glass boxes. They DO NOT go into the biohazard container.
- Broken test tubes should be discarded in the broken glass box. All other test tubes used in class are placed and consolidated in a rack at the designated location. Return empty racks to the proper cabinet.
  - NEVER write on test tube caps (write on glass test tube), and do NOT discard in biohazard or soft waste containers.
- Glass Pasteur pipettes should be discarded in the broken glass boxes, even if not broken. Do not discard the bulb; return it to the bag where you got it. Put the canister, once opened, on the bench by the slide warmer to be re-autoclaved.
• Glass serological pipettes (not the disposable pipettes) should be placed tip down in the pipette discard containers. Put the canister, once opened, back to be re-autoclaved.

**Plastic Waste**
• Any used but uncontaminated plastic material, i.e.: Eppendorf tubes, pipette tips, PCR tubes, should be placed in the soft waste bins. If there were no biological components used with the tip or tube, it is not contaminated and should NOT go into biohazard.
• Any contaminated plastic waste should be discarded in the biohazard bags at your bench or in the large biohazard bins.
• Place any plastic containers that are empty or need to be re-autoclaved on the waste cart. Do not throw the containers in the garbage or biohazard bins. Do not replace the containers on the supplies bench.

**Media**
• Any used or unusable plates should be discarded in the large biohazard bin. If a plate was not used, e.g. you grabbed one too many plates, return the plate to the supplies bench. It can be used by another student. Do not just discard and be wasteful.
• Any used or unusable media-filled test tubes should be consolidated in a rack on the waste bench. **Glass should never be discarded in the biohazard bins.**
• Any milk dilution bottle containing media should be placed on the waste bench even if there is leftover media. It must be re-autoclaved before the next use.
• Do not replace the used milk dilution bottle back on the sterile supplies bench.

**Chemicals**
• All reagents must be discarded in the labeled receptacle. DO NOT put any chemicals/reagents in the biohazard or soft waste bins.
  • Gram stain reagents collected in the stain trays should be discarded into the staining reagent discard container located near the sink. After the reagents are discarded, rinse the tray with water that should be flushed down the sink.
  • Certain tests require the use of syringes to add chemicals. DO NOT move or discard the syringe. Do not cap or re-cap the needle. Please leave this for the instructor.

**Penalties**
• Any failure to follow the waste disposal guidelines listed above will result in one warning given by the instructor. A failure to comply after the initial warning may result the deduction of Competence Points.
• If improper disposal continues after a grade deduction, the instructor has the ability to judge the student as incompetent in a laboratory setting. Incompetency will result in the student being unable to perform advanced tests. At the discretion of the instructor, this WILL affect the course grade.
• Any grievous offense determined by the instructor, e.g. improper disposal causes a person bodily harm, may result in failure of the class. The incident can and will be documented and brought to the attention of the Chair of Biological Sciences and the Dean of Students.
• Safety in the laboratory is the instructor’s and the University’s top concern. If you are unsure of the proper disposal of material, ASK!!
• Following strict guidelines is not only essential for teaching laboratories, but will be critical for your future careers as researchers or clinical health professionals.
**Microbiology Lab Safety Instructions**

To avoid injury to yourself and fellow students you are required to read, understand, sign, and abide by this agreement. Failure to comply with these rules while performing laboratory experiments may result in suspension or expulsion from this laboratory course.

1. **NEVER EAT, DRINK, OR SMOKE IN THE LABORATORY.**

2. If you have a medical problem or condition that may affect your performance or safety in the laboratory you must discuss it in private with your Laboratory Instructor. This information will be held in strict confidence.

3. You must wear closed-toed, full shoes in the laboratory. BARE FEET OR ANY TYPE OF SANDALS CANNOT BE WORN INTO THE LABORATORY. Failure to comply with this rule will result in your dismissal from lab for the day.

4. **YOU MAY NOT WEAR CUT-OFF TEE SHIRTS, MIDRIFF TOPS OR HALTERS IN THE LABORATORY.** If you are dressed inappropriately for lab, you will be dismissed from lab for the day.

5. **You MAY NOT PIPET any solution BY MOUTH.**

6. **NOTIFY YOUR INSTRUCTOR IMMEDIATELY** in case of any accident or spill.

7. Note the location of eye fountains and safety showers so that you can use them if needed.

8. Eye injuries, whether chemical or mechanical, must always be considered to be serious. The best procedure, in case of chemical injury to the eye is immediate, prolonged, continuous flushing with water (15-20 min) at an eye fountain. Eyes must be forced open to be washed well.

9. If you get any chemicals or cultures on your hands WASH YOUR HANDS IMMEDIATELY. Rapid and immediate treatment is essential. Clothing soaked with strong acid or alkali MUST immediately be removed. THIS IS NO TIME FOR MODESTY. The safety showers are mainly intended to be used in cases where corrosive chemicals are spilled or splashed over a large body area.

10. Give cracked or chipped glassware to your Instructor. Broken glassware MUST BE PLACED IN THE “BROKEN GLASS” BOX ONLY.

11. Never force glass rods, pipets, or tubing into rubber stoppers. **USE PROPER TECHNIQUE AND CARE WHEN INSERTING A PIPET INTO A PIPET BULB OR ELECTRIC PIPETTOR.**

12. For emergency treatment of any accident you must go to Presbyterian University Hospital. Transportation will be provided if needed — speak with your Instructor. You and your Lab Instructor together must file an Accident Report within 24 hours. Non-emergencies will be handled at Student Health.

13. Exercise great care in noting the odor of fumes, and **AVOID BREATHING FUMES OF ANY KIND.** Use fume hoods when necessary.

14. Long hair must be confined securely to minimize hazards.

15. **DO NOT RUN or “horse around” in the laboratory.** Do not engage in any activities or behavior that might confuse, startle, or distract another student.

16. **DO NOT PUT ANY CHEMICAL, SOLID OR LIQUID, BACK INTO THE STOCK BOTTLES** from which they were obtained. The excess chemical may now be contaminated. Ask your Instructor what to do with the excess chemicals.

17. **NEVER REMOVE chemicals from the laboratory.**

18. **IF A FIRE ALARM SOUNDS** while you are working in the laboratory, turn off any Bunsen burners, loop incinerators or other electrical appliances and leave the building by the nearest exit.

19. **WASH YOUR HANDS BEFORE YOU LEAVE LAB.** It is a good idea to wash your hands whenever they have been in contact with any chemical or culture, not just at the end of the lab period. When you leave for the day, use the BacDown antibacterial
soap provided.

20. Always clean your work area at the beginning and end of each lab period. Use the disinfectants provided.

21. An Instructor must always be present while students are working in the laboratory. YOU ARE NOT PERMITTED TO DO UNAUTHORIZED EXPERIMENTS.

22. Except in very unusual circumstances, all medical claims are the responsibility of the student. INSURANCE COVERAGE by either a student plan or family plan is strongly recommended.