

Virology, BS 1730

Spring, 2022 (2224)
Monday, Wednesday, Friday
12:00PM – 12:50PM
A221 Langley Hall

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Department of Biological Sciences

Course Description

Biological Sciences 1730 will present the basic concepts of virology focusing on the various roles viruses play in human health and disease and on their influence in shaping global ecology. Special emphasis will be placed on the genome structure and gene functions of viruses, how they replicate their genomes, the mechanisms of viral gene expression, and on viral interactions with cellular signaling pathways and the host's immune response. The course will begin with an introduction to the viral universe and the types of virions that exist on planet Earth. Then the focus will shift to viral infectious cycles. Here we will address how different viruses enter their hosts, how they transport to susceptible cells, and the sequential and synchronous molecular events that result in a successful infection. Finally, we will discuss current issues in virology including emerging viral pathogens, use of viruses in gene therapy and as anticancer drugs, and recent developments in virus detection and discovery. Students will have the opportunity to display their knowledge of virology by performing in three Exams and a comprehensive Final Exam.

Course Rationale

Viruses are found wherever biology is happening. It is likely that every individual of every species of organism that inhabits planet Earth, including you, is carrying one or more viruses. Virus particles are in streams and rivers and even in deep wells. The Oceans contain millions of virus particles in each milliliter. Viruses are in the air we breathe and the food we eat. Viral sequences are embedded in our genes. A relatively small number of viruses can cause disease in humans, or in pets, livestock, and plants. New viral pathogens are constantly emerging and Earth's climate changes viral pathogens are spreading to new populations of hosts. This course will focus on the interplay of viruses with their hosts at the molecular, cellular, and organismal level. The goal is to give the student an understanding of how viruses impact society through their effects on health, the economy, and global ecology.

Course Learning Objectives

To discuss, appreciate, and understand:

- (1) *The physical nature of viruses: their structure and how they assemble virions.*
- (2) *The molecular mechanisms of viral genome replication and gene expression.*
- (3) *Viral diversity and how this is reflected in different infectious strategies.*
- (4) *The constant war engaging host antiviral defense systems with viral countermeasures.*
- (5) *The relationship between human activity and the emergence of new viral pathogens.*

Required Materials:

There is no textbook.

You will need:

Access to the internet.

Your wits.

Course Expectations & Requirements:

- **Assignments and Projects:**

There are no special assignments beyond the three Exams and Final. Dr. Pipas will provide optional readings during the course.

- **Attendance:**

Class attendance is strongly recommended. There is no textbook associated with this class and the lecture topics will be dynamic. A PowerPoint version of the lectures will be posted. However, the posted version may not contain all the topics discussed in class.

- **Deadlines:**

Not Applicable

- **Class participation:**

Students are highly encouraged to ask questions during class, to email questions to Dr. Pipas, and to make use of the posted office hours. Dr. Pipas is also available to meet at other times but an appointment is recommended.

Grading

25%. Exam 1. Fifty-minute exam. Total of 100 points.

25%. Exam 2. Fifty-minute exam. Total of 100 points.

25%. Exam 3. Fifty-minute exam. Total of 100 points.

25%. FINAL EXAM. Comprehensive two-hour exam. Total of 100 points.

Important Dates:

February 4. Exam 1.

March 16. Exam 2.

April 20. Exam 3.

Date to be announced. FINAL EXAM

COURSE SCHEDULE

M	1	1/10	Structure and operation of the course. Pandemic.
W	2	1/12	The Viral Universe
F	3	1/14	Viral Infections
M		1/17	NO CLASS (Martin Luther King Day)
W	4	1/19	Molecular Biology Bootcamp: The Central Dogma.
F	5	1/21	Viral genomes: gene expression strategies.
M	6	1/24	Detecting Viruses
W	7	1/26	Cell Biology Bootcamp: Cell structures and functions.
F	8	1/28	Coronaviridae
M	9	1/31	Immunology Bootcamp

W	10	2/2	SARS-CoV-2
F	11	2/4	EXAM 1
M	12	2/7	Orthomyxoviridae
W	13	2/9	Orthomyxoviridae
F	14	2/11	Retroviridae
M	15	2/14	HIV
W	16	2/16	Paper 1
F	17	2/18	Picornaviridae
M	18	2/21	Flaviviridae
W	19	2/23	Paper 2
F	20	2/25	Flaviviridae
M	21	2/28	Paramyxoviridae
W	22	3/2	Paper 3
F	23	3/4	Rhabdoviridae and Filoviridae
M		3/7	SRPING BREAK
W		3/9	SPRING BREAK
F		3/11	SPRING BREAK
M	24	3/14	Review
W	25	3/16	EXAM 2
F	26	3/18	Polyomaviridae
M	27	3/21	Papillomaviridae
W	28	3/23	Paper 4
F	29	3/25	Adenoviridae

M	30	3/28	Adenoviridae
W	31	3/30	Paper 5
F	32	4/1	Herpesviridae
M	33	4/4	Herpesviridae
W	34	4/6	Paper 6
F	35	4/8	Poxviridae
M	36	4/11	Tumor Viruses
W	37	4/13	Paper 7
F	38	4/15	Viruses and Human Cancer
M	39	4/18	Review
W	40	4/20	EXAM 3
F	41	4/22	Future Virology

RECORDINGS

Lectures will be recorded on Zoom for students to review. 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.

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 course faculty 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 Professor 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

During this pandemic, it is extremely important that you abide by the [public health regulations](#), the University of Pittsburgh's [health standards and guidelines](#), and [Pitt's Health Rules](#). These rules have been developed to protect the health and safety of all of us. Universal [face covering](#) is required in all classrooms and in every building on campus, without exceptions, regardless of vaccination status. This means you must wear a face covering that properly covers your nose and mouth when you are in the classroom. If you do not comply, you will be asked to leave class. It is your responsibility have the required face covering when entering a university building or classroom. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

If you are required to isolate or quarantine, become sick, or are unable to come to class, contact me as soon as possible to discuss arrangements.

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).

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ZOOM POLICIES

Students and instructors are expected to work together to ensure a respectful and productive online learning environment. The [University of Pittsburgh Student Code of Conduct](#) applies to all behaviors, including online and in-person communications and interactions with classmates and instructors. We expect you to be professional and respectful to others when attending classes on Zoom. The following policies will be in effect for the duration of our online course using Zoom. Please carefully review these policies and direct questions to your section instructor. All students are expected to adhere to these policies in order to facilitate a professional and safe learning environment.

NOTE: Class meetings on Zoom (including video, audio, and chat text) will be recorded and made accessible to all students enrolled in this course section via Canvas until the course has concluded. Recordings will be deleted at the end of the semester. Breakout rooms are not recorded, but students may request to record individual breakout rooms.