

**Virology for Biotechnology BIOL 2565**  
**(Fall 2023)**  
**COURSE SYLLABUS**

**Course is from 3-6pm Thursdays online**

Instructor:

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TA: TBD

**ABOUT THE COURSE (IMPORTANT PLEASE READ!)**

**Course Description:**

The emphasis of this course will be on understanding the molecular mechanisms of viral pathogenesis. It will begin with a general introduction to the field of virology, a basic review of the immune response to viruses, and then focus primarily on the molecular biology of specific viruses that are associated with clinical human disease. Lectures will be based on the current literature and provide historical context.

**Reading Assignments:**

**Highly Recommended Textbook:** Molecular Virology of Human Pathogenic Viruses, Wang Shick Ryu

**Primary Literature:** In addition to the textbook, primary literature readings will be posted on canvas to supplement the textbook with current topics in Virology.

**Course Objectives:**

By the end of the course students should be able to evaluate current problems in modern Virology including viral pathogenesis and viral biology. This includes describing the structure and replication strategies of viruses discussed during the class.

- 1) Process of viral entry, translation, control of genome replication, viral assembly, and release from cells
- 2) Processes of viral latency
- 3) Immune defense mechanisms against viruses and the process of vaccination
- 4) Basic epidemiology of viruses
- 5) Mechanisms of viral suppression of the immune system and consequences for pathogenesis
- 6) Mechanisms and descriptions of oncogenic and oncolytic viruses
- 7) Integrate experimental systems learned in class and from primary literature into the design of experiments in other systems
- 8) Interpret data from experiments described and be able to draw conclusions from the data

**Credit Hours:**

Over the course of the semester students should expect to spend 3 hours per week in class (42 hours total). There will be assigned textbook and primary literature reading. It is expected that students come prepared for class by doing the assigned reading. It is expected that this will take

about 2 hours for each class (62 hours total). There will be online quizzes in each module based on primary literature, lectures, and assigned textbook readings (5 hours). In addition, there will be 1 online midterm and an online cumulative final. The final and midterm will be take-home and open book, but it is expected that students will be able to synthesize thoughts and ideas from previous knowledge learned throughout the course. It is expected that review for the midterms will take approximately 10 hours and review for the final will take 25 hours (35 hours total). There will be review sessions led by a TA throughout the semester (10 hours total). The final itself can take up to 3 hours. At the end of the semester there will be a final project. There are several options for a final project including a research proposal that is presented to the class or an animation short. If students have another idea for a final project this can also be discussed with the instructor. Students should expect to spend a minimum of 30 hours on researching the topic, and preparing this project.

***Class Participation:***

*The material in this course is best absorbed through interactive learning practices. Class participation is key for this process. Your class participation grade will be determined by your level of preparation and participation in both the lectures and in class workshops.*

***Flipped Class Organization:***

The class will be organized by topics, and after a series of lectures on the topic (a module) we will have a workshop. The format of these workshops will vary, but they will incorporate group and active learning activities to increase understanding of the topic. They will include viral modeling, solving problem sets in groups, identification of diseases and discussion of primary literature. Given the active-learning nature of this class, attendance is essential, as is coming to class prepared. *If you do miss a class contact the instructor for a missed class and an appropriate makeup assignment will be assigned.* Make-up assignments will only be given in cases of a college-accepted excused absence that has been documented.

***Final Project choices:***

***Short animation:***

Science communication is becoming an increasingly important factor in our daily life. Short videos can be an effective means of communicating information. Therefore, there one option for a final project that is an animation short. The animation should be 1-3 minutes.

The Multimedia lab will have some online learning modules for learning the digital animation program “After Effects”. Before starting the video please discuss with the TAs and Instructor. This is so we get a broad range of topics covered.

***Research Proposal:***

A 3000 word research proposal on a topic related to the content of the course should be written, and a presentation on the topic prepared for the class.

***Rubric for final project:***

The grading will be a general analytic rubric that is based on the ability to effectively communicate your understanding of a concept to others. This includes standards such as: Did you do a deep analysis of the topic? Does it effectively communicate to the target audience? Students in the class will evaluate the final projects and provide constructive feedback.

**Exams:**

In addition, the online quizzes (one per module) that focus on the primary literature, there will be two online exams, a midterm and a final. Both exams will be open note and open book, but will be timed. The midterm will be one hour long and the final two hours. It is expected that students do not discuss the exams with anyone else. Doing so will be a violation of the academic code.

**Assignments Summary and Grading Criteria:**

**Midterm Exam 20%**

**Cumulative Final Exam 25%**

**Final Project 15%**

**Class participation 20%**

**Online quizzes (one per module) 20%**

**ADDITIONAL NOTES (IMPORTANT PLEASE READ EVEN IF YOU WANT TO SKIP AHEAD TO THE GOOD STUFF.... I.E. VIROLOGY):****INCLUSION:**

Brown University is committed to full inclusion of all students. Please inform me early in the term if you may require accommodations or modification of any of course procedures. You may speak with me after class, during office hours, or by appointment. If you need accommodations around online learning or in classroom accommodations, please be sure to reach out to Student Accessibility Services (SAS) for their assistance (seas@brown.edu, 401-863-9588). Students in need of short-term academic advice or support can contact one of the academic deans in the College.

**Distribution of Materials:**

Lectures and other course materials are copyrighted. **Students are prohibited from reproducing, making copies, publicly displaying, selling, or otherwise distributing the recordings or transcripts of the materials.** The only exception is that students with disabilities may have the right to record for their private use if that method is determined to be a reasonable accommodation by Student Accessibility Services. Disregard of the University's copyright policy and federal copyright law is a Student Code of Conduct violation.

**Use of Technology to Support Student Learning in Your Course:**

This course will use the following technological platforms; Google Drive and Canvas. I am committed to ensuring access to online course resources by students. If you have any concerns or questions about access to any of these platforms, please reach out to me. The IT Service Center (<https://it.brown.edu/get-help>) provides many IT Services including remote assistance, phones, tickets, and chat. If you have any questions about the privacy of these platforms please reach out to the IT service center, and also see the Online and Hybrid Learning Student Guide.

**ACADEMIC INTEGRITY:**

Plagiarism and cheating are serious offenses and are more harmful to you, the student, than to the university. Please refer to the Brown University Academic and Student Conduct Codes for details regarding Brown University's policy on academic integrity and penalties for violating the academic code.

**Course Schedule (may be adjusted as needed):**

**MODULE 1: INTRODUCTION TO VIRUSES**

**Class 1:**        *Introduction, History and Methods*  
9/7                *Composition, Structure and Classification*  
Additional information in Chapters 1, 2, and 4

**Class 2:**        *Replication, Attachment and Entry*  
9/14.             *Genome Replication and Expression*  
Additional information in Chapter 3

**Class 3:**        *Pathogenesis, Immunity and Vaccines*  
9/21              Additional information in Chapter 5 and 25

**Quiz 1**

**MODULE 2: DNA VIRUSES**

**Class 4:**        *Parvoviruses and Papillomaviruses*  
9/28              Additional information in Chapters 7, 8, and 10

**Class 5:**        *Adenoviruses and Polyomaviruses*  
10/5              Additional information in Chapters 6 and 8

**Class 6**         *Poxviruses and Herpesviruses*  
10/12             Additional information in Chapters 9 and 10

**Quiz 2**

**Midterm (classes 1-6) timing TBA**

**MODULE 3: RNA viruses**

**Class 7:**        *Picornaviruses and Caliciviruses*  
10/19             Additional information in Chapters 11 and 13

**Class 8:**        *Flaviviruses and Togaviruses*  
10/26             Additional information in Chapter 12 and 13

**Class 9:**        *Coronaviruses and Orthomyxoviruses*  
11/2              Additional information in Chapter 13 and 15

**Class 10:**      *Rhabdoviruses and Arenaviruses*  
11/9              Additional information in Chapter 14 and 16

**Class 11:**      *Bunyaviruses, Filoviruses and*  
11/16             Additional information in Chapter 16

### **Quiz 3**

**11/23: No Lecture (Thanksgiving)**

### **MODULE 4: RETROVIRUSES AND HEPADNAVIRUSES**

**Class 12:**     *Retroviruses and Hepadnaviruses*

11/30           Additional information in Chapter 17, 18, and 22

### **Quiz 4**

**Class 13:**     *Final project presentations and discussions*

12/7

*12/8-12       Reading Period*

**Final Examination Online Exact Deadline TBA**