

VBS/MG/CBG 7741: Molecular Virology and Pathogenesis of Viruses

The Ohio State University
Autumn Semester 2022

Instructors: Dr. Amanda Panfil (380 Veterinary Medicine Academic Building, telephone 292-7449, e-mail panfil.6@osu.edu) is the course director and primary contact person for general course or enrollment related questions. The course is divided into 7 modules, with a different module leader for each as described in a section below. Please direct module specific questions to the appropriate module leader or instructor.

Class meetings: Mondays, Wednesdays & Fridays; 9:00-11:00 AM
[Veterinary Medicine Academic Building](#) Rm 084 (VMAB 084)

This course will take place in-person. We will follow all University guidance regarding masks and social distancing. If you have a situation that might cause you to miss a period of class (i.e., illness, quarantine), discuss it with Dr. Panfil as soon as possible.

Course Materials: *Principles of Virology*, 5th edition, Volumes I and II (bundle) by Flint et al, ASM press, copyright 2020. Available for Purchase on [RedShelf](#), [VitalSource](#), and the Barnes and Noble University Bookstore. For some lectures, you may be given assignments from other texts or papers. These will be posted on Carmen.

Technology Skills needed for this Course: [Navigating CarmenCanvas](#)

Course Description: This course will be team taught by experts in the respective areas. The course will emphasize both the molecular mechanisms by which animal and plant viruses replicate as well as the virus/host interactions that lead to virus pathogenicity and/or oncogenesis. The course also features student-led presentations of recent original articles that relate to lecture topics. Although an overview of most families of viruses will be presented, representative members of major virus groups will be studied in depth. In this course, we will examine interactions of viruses with single cells as well as complex interactions of viruses with their natural hosts.

Prerequisites: No prior coursework in virology or microbiology is required. However, students should have a strong background in molecular biology and biochemistry, including an in-depth understanding of DNA replication, transcription and translation mechanisms, as well as a general idea of how these processes are controlled in eukaryotic cells. Suggested courses to have been completed include Molecular Genetics 701 and Biochemistry 702, or IBGP 701 and 702, **or equivalent graduate course(s) in biochemistry/molecular biology**. Undergraduates are not permitted to register without **written** permission of Dr. Panfil, and only those with appropriate graduate-level course equivalents will be allowed to register.

Grading: Final course grades will be calculated as follows:

Midterm exam	25%
Final exam	25%
Student presentations for assigned original journal articles	25%
Dropbox answers for assigned original journal articles	25%

Examinations: There will be two examinations—**A Midterm (Monday, October 10th, 9:00-11:00am)** and a **Final examination (Wednesday, December 14th, 8-9:45am)**. Each of the exams will account for 25% of your grade. The midterm will cover the material from Modules 1-3, and the final will cover the material from Modules 4-7. Although the final is not comprehensive, the material in modules 4-7 builds on information in the first three modules, so you are expected to retain the basics of that information. If you know that you will be absent or unable to take an examination at the time and/or date indicated, you should contact Dr. Panfil as soon as possible to arrange a make-up. Generally, make-up examinations will not be given unless approved **prior to** the examination. Examinations may consist of any or all of the following formats: multiple choice, true-false, matching, or short answer.

Student Presentations: Students will be responsible for oral presentation of 1 or 2 assigned articles, depending on the number of students registered. Presentations will be graded by the faculty member in charge with consultation by Dr. Panfil. Generally, at least two faculty members will be present at student presentations in order to fairly normalize grades across all presentations. The grade in this category will account for 25% of the total grade, regardless of the number of presentations given by a particular student. Students presenting on a particular day **DO NOT** have to respond to questions in the dropbox for that day. These students will automatically be given maximum credit for the dropbox for that day. A detail of what is expected for presentations is listed below in '**Guide to Good Student Presentations of Original Literature**'.

Dropbox answers: The original papers that will be discussed contain information that is important for all students to gain, regardless of the quality of the student presentation. This knowledge will be enhanced by a thorough discussion of the paper by all participants. To ensure that all registered students have thoroughly read and understood the major points of each paper, each student will be required to answer the questions posted in the dropbox associated with each paper. Although most of the questions are the same or similar for each dropbox, students should look over them carefully before answering, as instructors may change them somewhat. Dropbox questions will appear approximately one-week prior to submission date. **All submissions are required to be submitted in pdf form (Word documents will not be accepted!) by 9 AM on the morning in which the paper will be discussed.** Each dropbox submission will be worth a total of 10 points and there will be 11 dropbox assignments (total of 110 points). The cumulative points from all dropboxes will account for 25% of the total grade. Students who have been excused from class by Dr. Panfil, **PRIOR to** the date of the class (for example, to attend a scientific meeting or illness),

will also have to complete dropbox questions, but may be allowed to read and/or submit them outside of the assigned timeline.

Attendance and Participation: Students are expected to attend all meetings of the course. Preparation for class and in-class participation and contributions are important for student learning and are weighted heavily in the final grade. **The most valuable contributions often begin with the words, “I don’t understand.”** Coming to class prepared and answering questions from your peers and your instructor are also helpful. In the event that you must miss class, you are responsible for the contents of the lecture and/or discussion.

Plagiarism and academic misconduct: It is the responsibility of the Committee on Academic Misconduct (COAM) to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed, illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Plagiarism is presenting another person's words, ideas, or sequence of arguments as your own without attribution. If at any point, however, you have a question about this, please ask. It is the instructors' responsibility to report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487), and the professor and discussion section leaders take this responsibility seriously. For additional information, see the Code of Student Conduct (<https://studentconduct.osu.edu>). Some examples of academic misconduct:

- Knowingly providing or receiving information during an exam
- Falsifying documentation to excuse a missed exam
- Lying about a death in the family to excuse a missed exam
- Asking instructors to alter your grade as a special personal favor

Students with disabilities: (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The university strives to make all learning experiences as accessible as possible. In light of the ongoing pandemic, students seeking to request COVID-related accommodations may do so through the university’s **request process**, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let Dr. Panfil know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, plan with Dr. Panfil as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS

contact information: 098 Baker Hall, 113 W. 12th Avenue; telephone 614-292-3307, slds@osu.edu; slds.osu.edu. This course requires the use of CarmenCanvas, Ohio State's learning management system, and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with Dr. Panfil.

Email: Electronic mail is a valuable tool. The instructors will, from time to time, send emails to the class. Because this is a team-taught course, please copy Dr. Panfil (course organizer; panfil.6@osu.edu) on messages related to the class.

Technology Support: For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- Self-Service and Chat: go.osu.edu/it
- Phone: 614-688-4357 (HELP)
- Email: servicedesk@osu.edu

Guide to Good Student Presentations of Original Literature:

Presentations – The length of your presentation should be approximately 35 min. Your presentation should be polished so that you do not exceed your time! Your presentation will be interrupted with questions from the students and faculty in the audience, bringing the total time to about 55 minutes. You may use notes, but do not read your presentation. It is suggested that you schedule a meeting with the instructor in charge of your session to review your presentation (including your images) **a few days** in advance of your talk so that there is time to make adjustments.

Your presentation must include: Introduction, Results, and Discussion. About half of the presentation should be on experimental results. Handouts to the class may be appropriate, especially for any background or additional material that is not covered in the paper. It is expected that the presenter will have read many more papers and reviews in addition to the assigned readings so that he/she will be well prepared to present the material and to answer questions in an intelligent and thorough manner.

Introduction –Describe the purpose of the study or the hypothesis that is being tested. Do not dwell on material that was covered by the instructor or other students in earlier sessions.

Results – What did the authors do and what did they observe? Were the techniques employed appropriate? You should be thoroughly prepared to discuss why and how the experiments were done and what the results actually show. If any new techniques are described, go over them in some detail. Since the class has already read the article, IT IS NOT NECESSARY TO GO OVER EACH EXPERIMENT IN THE PAPER. Instead, you should discuss only the KEY EXPERIMENTS from the paper.

Discussion – What do the results of the paper mean? What are the most important take-home messages of the paper? Does the paper change the way we think about a particular problem? What influence does it have on present concepts? Are there any weaknesses in the paper? What should be done next?

Presentation requirements: Students are **REQUIRED** to give PowerPoint presentations. The images and figures presented **MUST BE OF HIGH QUALITY**. Be sure the figures are large, and the text is easy to read. Do not include too much information on a single **IMAGE**. Do not clutter your images with unnecessary PowerPoint "decorations" or "tricks" or use excessive or inappropriate colors. It is often helpful to label figures with some text (instead of lane number, for instance) and to use arrows or boxes to direct the audience to particular lanes or areas in a figure that support a conclusion.

Evaluation of presentation: You will meet with the instructor(s) immediately after class (if possible) or at a mutually agreed time within the next week in order to obtain feedback on your presentation. The instructor may give you a sense of the grade range or post a tentative grade. However, final grades will not be assigned until after all presentations

have been made in order to normalize grades across the entire spectrum of presentations and instructors.

Above average presentation (A range): Presentation shows significant new insights, contains material (background or discussion) that goes significantly beyond the assigned paper; excellent visual aids/handouts. It is clear that the student both understands and discusses the major points made by the paper, is aware of flaws, can differentiate speculation from firm conclusions, and can thoroughly discuss nuances in the techniques employed (or answer questions about them).

Average presentation (B range): Clear presentation of the paper in good English; good visual aids and/or handouts; no major scientific mistakes. Student may not be able to differentiate speculation from conclusions, or completely understand or discuss techniques used. Students may not be able to adequately critique some of the experiments or conclusions.

Below average presentation (C or lower): Poorly organized; too long; too short; did not follow above instructions, did not read and/or understand important background literature, significant language difficulties; no new insights; serious scientific mistakes; low quality visual aids/handouts.

Class Modules and Faculty Contact Information

Module 1: Introductory material on virus replication and host immune responses

Instructors: Amanda Panfil (Module 1 leader): panfil.6@osu.edu
Christopher Walker: christopher.walker@nationwidechildrens.org

Module 2: Positive stranded RNA viruses

Instructors: Zongdi Feng (Module 2 leader): Zongdi.Feng@nationwidechildrens.org
Amit Kapoor: kapoor.102@osu.edu
Jianrong Li: li.926@osu.edu

Module 3: Negative stranded RNA viruses

Instructors: Mark Peeples: (Module 3 leader): Mark.Peeples@nationwidechildrens.org
Andrew Bowman: bowman.214@osu.edu
Stefan Niewiesk: niewiesk.1@osu.edu

Midterm Exam: Monday, Oct. 11th; 9-11 AM (Modules 1-3); VMAB 084

Module 4: Herpesviruses

Instructors: Marshall Williams (Module 4 leader): williams.70@osu.edu
Maria Ariza: ariza.3@osu.edu
James Waldman: james.waldman@osumc.edu

Module 5: Small DNA viruses

Instructors: Amanda Panfil (Module 5 leader): panfil.6@osu.edu
David Bisaro: bisaro.1@osu.edu
Jessica Herstine: Jessica.Herstine@nationwidechildrens.org
Tasha Wilkie: wilkie.20@osu.edu

Module 6: Retroviruses

Instructors: Shan-Lu Liu (Module 6 leader): liu.6244@osu.edu
Sanggu Kim: kim.6477@osu.edu
Amanda Panfil: panfil.6@osu.edu
Amit Sharma: sharma.157@osu.edu

Module 7: Plant virus systems and viroids

Instructor: David Bisaro (Module 7 leader): bisaro.1@osu.edu

Final Exam: Wednesday, Dec. 14th; 8-9:45 AM (Modules 4-7); VMAB 084

Course Schedule

Day	Date	Topic	Instructor
Wednesday	Aug. 24 th	Viral Lifecycle I	Panfil
Friday	Aug. 26 th	Viral Lifecycle II	Panfil
Monday	Aug. 29 th	Viral Lifecycle III	Panfil
Wednesday	Aug. 31 st	Viral Immunology I	Walker
Friday	Sept. 2 nd	Viral Immunology II	Walker
Monday	Sept. 5 th	No Class	
Wednesday	Sept. 7 th	Paper Presentation #1	Walker/student
Friday	Sept. 9 th	Noroviruses & Coronaviruses I	Li
Monday	Sept. 12 th	Noroviruses & Coronaviruses II	Li
Wednesday	Sept. 14 th	Paper Presentation #2	Li/student
Friday	Sept. 16 th	Picornaviruses	Feng
Monday	Sept. 19 th	Hepatitis B & D viruses	Feng
Wednesday	Sept. 21 st	Flaviviruses (including Hep. C)	Kapoor
Friday	Sept. 23 rd	Paper Presentation #3	Kapoor/student
Monday	Sept. 26 th	Respiratory syncytial virus/Measles virus	Peeples
Wednesday	Sept. 28 th	Arenavirus/Bunyavirus	Peeples
Friday	Sept. 30 th	Paper Presentation #4	Peeples/student
Monday	Oct. 3 rd	Influenza virus	Bowman
Wednesday	Oct. 5 th	Paper Presentation #5	Bowman/student
Friday	Oct. 7 th	Rabies virus	Niewiesk
Monday	Oct. 10 th	Midterm Exam	
Wednesday	Oct. 12 th	Alpha-herpesvirus	Williams
Friday	Oct. 14 th	No Class	
Monday	Oct. 17 th	Paper Presentation #6	Williams/student
Wednesday	Oct. 19 th	Beta-herpesvirus	Waldman

Friday	Oct. 21 st	Paper Presentation #7	Waldman/student
Monday	Oct. 24 th	Gammaherpesvirus latency & pathogenesis	Ariza
Wednesday	Oct. 26 th	ssDNA phage, geminivirus replication	Bisaro
Friday	Oct. 28 th	HPV & polyomavirus	Wilkie
Monday	Oct. 31 st	Paper Presentation #8	Wilkie/student
Wednesday	Nov. 2 nd	Adenovirus & Ad gene therapy; Parvovirus & AAV gene therapy	Herstine
Friday	Nov. 4 th	Retroviral infection within the Organism	Liu
Monday	Nov. 7 th	Emerging Viruses	Liu
Wednesday	Nov. 9 th	Paper Presentation #9	Liu/student
Friday	Nov. 11 th	No Class	
Monday	Nov. 14 th	Intracellular Events of Retroviral Infection I	Kim
Wednesday	Nov. 16 th	Intracellular Events of Retroviral Infection II	Kim
Friday	Nov. 18 th	Paper Presentation #10	Kim/student
Monday	Nov. 21 st	Oncogenic Retroviruses	Panfil
Wednesday	Nov. 23 rd	No Class	
Friday	Nov. 25 th	No Class	
Monday	Nov. 28 th	Animal Models of Retroviral Infection	Sharma
Wednesday	Nov. 30 th	Paper Presentation #11	Sharma/student
Friday	Dec. 2 nd	Plant DNA Viruses	Bisaro
Monday	Dec. 5 th	Viroids & Spread of Viruses/Viroids in Plants	Bisaro
Wednesday	Dec. 7 th	Antiviral Defenses & RNA Silencing	Bisaro
Wednesday	Dec. 14 th	Final Exam	