

BMS 553
Fall 2009, Class # 32534 Virology

Syllabus

Revised 8/31/09

Location and meeting times: All lectures are planned to be held on Tuesday s and Thursdays from 9:30 to 11:20 am in conference room CMS 5112.

Course coordinator

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Guest Instructors

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Course description

This course will focus on animal virology, and include an introduction to bacteriophages. Viral replication strategies will be covered in depth for selected viral families. In addition, viral structure, pathogenesis, immunity, antivirals, diagnostics and epidemiology will be taught for a number of viruses of medical importance, including emerging viruses.

Competencies and specific learning objectives

1. Demonstrate additional depth of knowledge in a specialized area.
 - Fully understand the basic concepts of virology.
 - Learn the details of viral replication for several viral families, which will serve as examples of various replication strategies of RNA and DNA viruses.
2. Apply fundamental concepts in the biomedical sciences to public health issues, in particular, in the detection, treatment and prevention of disease.
 - Learn the advantages and limitations of various viral diagnostics.
 - Describe control measures for viral diseases.
3. Describe the contribution of other quantitative disciplines of public health, such as epidemiology, to the understanding of the causes of disease and its spread among populations.
 - Understand the various models of viral disease transmission.
4. Critically evaluate the work of peers in biomedical sciences, including the choice of methods applied to problems and the interpretation of results obtained, through journal clubs taken every semester and colloquia courses.
 - Comprehend and analyze viral research in the assigned primary literature.

5. Demonstrate needed communication skills, both verbal and written in order to publish (and so disseminate) the results of the research and to obtain funding for it.
 - Improve written communication skills during short essay examinations.
 - Improve oral communication skills during presentation of viral topic in class.
6. Describe the major cellular and molecular processes which promote immediate host responses to pathogens and also lead to long-term immunological protection.
 - Explain the innate and specific immune response to viral infection, including correlates of immune protection for various viruses.
7. Demonstrate broad knowledge of the cellular and molecular bases of host pathogen interactions.
 - Understand viral attachment, entry and replication in the host cell for several viral families. Contrast RNA and DNA viruses.
 - Describe interaction of a virus with its host cell receptor. Give specific examples.
8. Identify the major factors that lead to the emergence of new pathogenic agents, and how human behavior plays a role.
 - Explain how viruses evolve in context of the host and the environment.
 - Describe the factors involved in the emergence of viruses.
9. Describe the principal mechanisms by which specific pathogens infect their hosts and cause disease.
 - Describe the interaction of the virus with the entire host, including portal of entry, tissue tropism, spread within the host, and viral persistence.
 - Understand concepts involved with immunopathology.
10. Describe the different means by which vaccines and antivirals are used to combat some infectious disease.
 - Demonstrate knowledge of the history and current state of viral vaccines.
 - Gain an appreciation for antiviral discovery and current challenges to the biomedical field.

Prerequisites

Molecular cell biology and genetics (BMS 500 and BMS 500b) are prerequisites. Equivalent courses may be accepted with approval of the instructors.

Grading policy

Exam I	20%
Exam II	20%
Exam III	30%
Presentation	20%
Class participation/discussion	10%

Questions for each exam will be based on a combination of class material and required readings assigned by faculty. Exams will be closed book and in class. Questions will be short essay style. The student presentation will be graded on the outline, and the thoroughness and clarity of the presentation. A final letter grade (A-E) will be calculated on the total of 100%. The exams, presentation and class participation are mandatory. Attendance is expected for every class. In the case of absence for medical reasons, a written medical excuse is required. Students must follow Standards of Academic Integrity, Appendix C, in the Community Rights and Responsibilities Handbook, SUNY-Albany, 2003-2004. Violations will result in a failing grade (E) in this course.

Course schedule

Date	Lecture#	Subject	Lecture summary	Lecturer
09/01/09	1	Introduction	Overview of the course, history of virology and basic taxonomy.	Wentworth
09/03/09	2	Virology 101	Virus replication strategies, viral assays, and diagnostics	Wentworth
09/08/09	3	Viral entry	Viral attachment and fusion proteins and their interaction with host cell receptors. A discussion will follow.	Wentworth
09/10/09	4	Picornavirus	An overview of picornavirus replication will be covered.	Ramsingh
09/15/09	5	Coxsackie virus Pathogenesis	Specific mechanisms by which coxsackievirus infections lead to pathology.	Ramsingh
09/17/09	6	Flavivirus replication	All aspects of flavivirus replication will be covered.	Moudy
09/22/09	7	West Nile Virus	Ecology and evolution of West Nile Virus	Styer
09/24/09	8	Viral structure	Virion structure, principles, and methodology will be covered	Jaeger
09/29/09	9	Review/Discussion	Discussion and review session	Wentworth, Zhou
10/01/09		Exam 1	Covers Lectures 1-8	Wentworth, Zhou
10/06/09	10	Coronavirus Replication	All aspects of coronavirus replication, with a focus on RNA transcription and replication	Wentworth
10/08/09	11	Coronavirus ecology, and pathogenesis	Species specificity, spike-receptor interactions, and emergence of SARS-CoV	Wentworth
10/13/09	12	Rhabdoviruses	Replication and pathogenesis of rabies virus, with some discussion of vesicular stomatitis virus.	Davis
10/15/09	13	Lyssavirus ecology and evolution	The evolution (over 4,000 years) of lyssavirus and the numerous viral variants seen today.	Rudd
10/20/09	14	Paramyxovirus	Replication and pathogenic strategies employed by paramyxoviridae	Wentworth
10/22/09	15	Orthomyxovirus replication	All aspects of replication including entry, mRNA transcription, and gRNA replication.	Wentworth
10/27/09	16	Influenza A Virus Pandemics	Evolution and ecology of influenza A viruses, and factors important pandemics.	Wentworth
10/29/09		Exam 2	Covers Lectures 9-16	Wentworth, Zhou

Course schedule continued.

Date	Lecture#	Subject	Lecture summary	Lecturer
11/03/09		No Class	Election day	
11/05/09	17	Retroviruses	An overview of retrovirus replication will be discussed, with an emphasis on HIV.	Parker
		Due date	Outline of Student Presentations	Wentworth
11/10/09	18	Bacteriophages	An overview of bacteriophages will be covered.	Burch
11/12/09	19	Herpes replication	The herpesvirus replication process will be covered	Burch
11/17/09	20	Herpes virus-host cell interactions	The interaction of herpesvirus with cellular organelles and host proteins.	Burch
11/19/09	21	Poxviruses	An overview of poxviruses and their use as recombinant vaccines will be covered.	Gray
11/24/09	22	Anti-virals	Discovery of antivirals and their actions will be covered.	McSharry
11/26/09		No Class	Thanksgiving	
12/01/09	25	Togavirus	Toga: replication and diseases	Gridly
		Arenavirus	Arena: LCMV & host immune response	Huntington
		Filovirus	Filovirus: Ebola virus Pathogenesis	McKeon
12/03/09	26	Hepadnaviruses	Hepadna: Hepatitis B Virus Replication	Jones
		Papillomavirus	Papilloma: oncogenesis and vaccines	Yermakova
12/08/09		Reading Day		
12/10/09		Final Exam	Covers lecture periods 1-26 with an emphasis on 17-26.	Wentworth, Zhou

Required reading

Research articles and/or book chapters will be assigned by individual lecturers. These will be required reading for discussion during class and for exams.

Recommended reading and other resources

The following textbooks have been put on reserve at the ESP library and are good resources:

- 1) Fields' Virology, 5th edition (Volume I and II), editors-in-chief: Knipe and Howley, Lipincott, 2006
This is the definitive virology reference and is organized by viral families.
- 2) Principles of Virology, 3rd Edition (Volume I and Volume II) Author: S. Jane Flint, Lynn W. Enquist, Vincent R. Racaniello, and Anna Marie Skalka, 2008
This text is organized by themes.

Wadsworth Center seminars presented by virologists will be announced in class, and attendance by students will be strongly encouraged.

Lecture presentations and/or other materials will be available on the course website. Access the website as follows:

Go to the following: <http://eres.ulib.albany.edu.libproxy.albany.edu/default.asp>

Click on “electronic reserves course index”

Search for course using “biomedical sciences” and Wentworth

Select BMS 553

Password is viruses-rule

A few websites of interest:

All the Virology on the World Wide Web (<http://www.virology.net/garryfavwebindex.html>)

Wong’s Virology (<http://virology-online.com>)

Centers for Disease Control and Prevention (<http://www.cdc.gov>)

CDC Division of Vector-borne Disease (<http://www.cdc.gov/ncidod/dvbid/index.htm>)

International Committee on Taxonomy of Viruses (<http://www.ictvonline.org/>)

Institute for Molecular Virology, UW-Madison (<http://www.virology.wisc.edu/IMV/>)

ProMED-mail, the Program for Monitoring Emerging Diseases (<http://www.promedmail.org>)