

Course Syllabus for
BMS610: Microbial Pathogenesis

Course Directors:

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Office hours per arrangement.

Course Description and Overview: The objective of the course is to provide students with a background in the mechanisms of microbial pathogenesis and an appreciation of the continuing and serious impact of infectious disease on modern life. Students will learn basic principles of host-parasite interactions and how human behavior has influenced both the resurgence of old diseases and the emergence of new ones. Intervention strategies, including vaccination and drug therapy, will be discussed, and reasons for the successes and failures of these approaches will be considered for individual cases. Finally, paradigms of host-parasite interactions will be illustrated by studying, at the molecular and cellular levels, specific infectious diseases and the agents that cause them.

Learning Objectives: Successful completion of this course should enable students to:

- Demonstrate broad knowledge of the cellular and molecular bases of host pathogen interactions;
- Identify the major factors that lead to the emergence of new pathogenic agents, and how human behavior plays a role;
- Describe the principal mechanisms by which specific pathogens infect their hosts and cause disease;
- Describe the different means by which vaccines and antibiotics are used to combat infectious disease;
- Apply the principles of infectious disease to a selected research problem in the field.

Topics: Class schedule is attached.

Faculty: Four BMS faculty members in addition to the course directors give lectures in this course, as noted on the schedule. They include: Drs. Sudha Chaturvedi, Arlene Ramsingh, and Harry Taber. Contact information is provided at the start of classes.

Contact Hours: This is a 3 credit course that meets for 90 minutes twice weekly, (T/Th 11:00 – 12:20) throughout the semester in DAI 1041.

Grading: Grading will be A-E, based upon a home exam (35% each), quizzes (35%) an oral student presentation (10%), written research paper (10%), and class participation (10%). Attendance is required at all classes.

Student Evaluation: Students will be evaluated using a combination of class participation, two written exams, a paper, and an oral presentation on the topic of the paper, as described in the Grading section.

Textbook: The required textbook is *Bacterial Pathogenesis: a molecular approach*, 3rd edition, by B. Wilson, A. Salyers, D. Whitt and M. Winkler. ASM Press 2011. This text will be supplemented with additional readings from the current literature, as appropriate.

Prerequisites: There are no formal prerequisites for this course. However, the target audience is doctoral students in the School of Public Health, particularly those in the Immunology and Infectious Diseases Track of the Department of Biomedical Sciences. An appropriate background in molecular biology and immunology is recommended. Students are encouraged to contact the instructors with any questions.

Part I: Principles of Host-Parasite Interactions

- 1/20 1: Introduction to Microbes and Infection (McDonough)
1/25 2: Host Defenses (McDonough)
1/27 3: Experimental Approaches to Host-Parasite Interactions (McDonough)
2/1 4: Emerging infections and Fungal Virulence Mechanisms (Chaturvedi)
2/3 5: Fungal Virulence Mechanisms II (Chaturvedi)
2/8 6: Viral Pathogenesis I (Ramsingh)
2/10 7: Viral Pathogenesis II (Ramsingh)
2/15 8: Parasites and Arthropod Vectors (Chaturvedi)
2/17 9: Parasite Virulence Mechanisms II (Chaturvedi)
2/22 - *No Class- UAlbany break*
2/24 - *No Class- UAlbany break*
Hand out exam I
3/1 10: Bugs and Drugs I (Taber)
3/3 11: Bugs and Drugs II (Taber)
Exam I due back

Part II: Bacterial Paradigms of Parasite-Host Interaction

- 3/8 12: Bacterial Virulence Mechanisms-Attachment and Invasion (Mantis)
3/10 13: Invasion II (Mantis)
3/15 14: Intracellular Survival I (Mantis)
3/17 15: Intracellular Survival II (Mantis)
3/22 16: Virulence gene regulation (TBD)
3/24 17: Secretion systems (TBD)
3/31 18: Toxins I (Mantis)
4/5 19: Toxins II (Mantis)
4/7 20: Biofilms (Mantis)
4/12 21: Life in two hosts (Mantis)
4/14 22: Genomics and systems biology in pathogenesis (Mantis)
4/19 - *No Class- UAlbany break*
4/21 - *No Class- Ualbany break*

- 4/26 (student presentations from selected topics)
4/28 (student presentations from selected topics)
5/3 (student presentations from selected topics)

Possible Student Presentation Topics

1. *Yersinia*, including plague- Is virulence really a continuum?
2. *Salmonella*- Invasive enteric pathogen and facultative intracellular pathogen
3. *Shigella*- A “non-invasive” invader?
4. *E. coli*- when isn't it harmless?
5. Cholera- toxin-based enteric disease complicated by horizontal gene transfer
6. Legionnaires' Disease- a modern disease caused by an intracellular pathogen.
7. Lyme disease- also relatively new on the scene- a vector-borne zoonosis
8. Whooping Cough- ground zero of the vaccination debate.
9. HIV- have Koch's postulates really been fulfilled? What about a vaccine?
10. *Helicobacter pylori*- ulcers and cancer? Koch's postulates tested again.
11. TB- modern twists add to repertoire of an old killer.
12. *Listeria*- a 'model' pathogen.

Additional Reading List:

Cellular Microbiology, 2nd ed. P. Cossart, P. Boquet, S. Normark, R. Rappuoli. 2005.

Animalcules, B. Dixon. 2009.

Molecular Genetics of Bacteria, 3rd edition. L. Snyder and W. Champness. 2007.

The Immune Response to Infection. S. Kaufmann, B. Rouse, D. Sacks. 2011.

Other:

Microbial Pathogenesis Monthly Research Meeting

Meets 1st Weds of each month in Aud B of DAI;

Check Wadsworth Calendar of Events for meeting topics

Infectious Diseases Journal Club

Fridays at noon.