

BMS 610 Microbial Pathogenesis Spring 2009

The primary goal of this course is to serve as an in-depth introduction to the fundamental principles and molecular mechanisms by which bacteria cause disease. The course will be a combination of lectures and discussions of the primary literature. Articles chosen for class discussion will represent significant milestones or paradigm shifts in the field of microbial pathogenesis. Upon completion of the course, the students should be capable of understanding and critiquing primary literature in primary journals such as *Infection and Immunity* and *Cell Host & Microbe*. This course satisfies a requirement for the BMS Immunology and Infectious Disease (IID) Track.

Class schedule and location:

Tuesday and Thursday 11:30 AM-12:45 PM,
Center for Medical Sciences (CMS) Room 5112

Instructor and contact information

Nicholas Mantis, Ph.D.

Assistant Professor, Department of Biomedical Sciences

Research Scientist IV, Division of Infectious Diseases

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Office hours: By appointment.

Prerequisites: A basic understanding of molecular genetics, biochemistry and cell biology fulfilled by satisfactory completion of BMS 504a Comprehensive Biochemistry and BMS 500 Molecular Cell Biology. A previous introduction to prokaryotic biology is beneficial, but not necessary.

Textbook: *Cellular Microbiology*, 2nd Edition Editors: Pascale Cossart, Patrice Boquet, INSERM, Staffan Normark, Rino Rappuoli (ISBN or Item Number: 978-1-55581-302-4) Available from ASM Press (\$99) (<http://estore.asm.org/>)

Additional Resources:

Todar's Online Textbook of Microbiology (www.textbookofbacteriology.net/index.html)

Other course requirements: Two 3-5" three ring binders. One binder will be for assigned articles. The other binder will be for articles related to your term papers.

Evaluations/grades:

Course grades will be based on the following formula:

60% Class attendance, preparedness (including binders and questions), participation, and quizzes.

10% Term paper 1 (due 2/24/09)

10% Term paper 2 (due 4/14/09)

20% Final Term paper (due 5/7/09)

Class binder: You will be responsible for keeping a class notebook/binder with all the articles that will be discussed over the course of the semester. *For each class, you should have read the assigned articles, answered the questions provided with each, and written your own questions (4-5) for discussion purposes. These notebooks will be inspected weekly for organization and preparation with questions.*

Quizzes: There will be 4-5 unannounced quizzes over the course of the semester. Each quiz (10 points) will take 10-15 min to complete and will generally consist of 2-3 questions from the day's assigned readings. You will be allowed to "drop" one quiz over the course of the semester (i.e., lowest grade).

Term papers:

Over the course of the semester, each student will be required to develop a six page grant proposal ("**Final term paper**") that addresses a **significant issue (or bacterium) in microbial pathogenesis**. The grant proposal should include four parts: (i) specific aims and hypothesis (1 page); (ii) background and significance (2 pages); (iii) experimental design (3 pages); (iv) references (pages as needed).

Term paper 1: The goal of term paper 1 is to identify a problem (or specific pathogen) that is significant to the field of microbial pathogenesis. The paper (2-3 pages) should identify and critique several key papers from the past 10 years that address the problem of interest. This first term paper should effectively serve as the background section of your final term paper. It should also provide a rough hypothesis for the project. Each student will also be required to present (5 min) his/her research topic to the class.

Term paper 2: This paper will effectively serve as your "specific aims and hypothesis" section of the final term paper. It should be one page in length, and should outline 3-4 specific aims that will enable you the hypothesis you put forward in term paper 1. These specific aims pages will be peer reviewed in class.

Final term paper: The final term paper should be formatted as an NIH grant application (<http://grants.nih.gov/grants/funding/416/phs416.htm>) and include the four sections listed above. The paper should not exceed 6 pages (double spaced), excluding references. Figures from published manuscripts should be included as "preliminary data".

Tentative Course schedule

Date	Tue/Thur	Lect.	Topic	Chap	Instructor
1/22/09	R	1L*	Introduction to Prokaryotic Biology and Microbial Pathogenesis	1	Mantis
1/27/09	T	2L	Attachment and invasion	5,12	Mantis
1/29/09	R	3D*	Attachment		Mantis
2/3/09	T	4D	Invasion		Mantis
2/5/09	R	5L	Intracellular survival	10	Mantis
2/10/09	T	6D	Intracellular survival		Mantis
2/12/09	R	7D	Intracellular survival		Mantis
2/17/09	T	--	No class-Winter Break		
2/19/09	R	--	No class-Winter Break		
2/24/09	T	8	Term paper 1 due Presentation of research topics		
2/26/09	R	9L	Toxins	13-14	Mantis
3/3/09	T	10D	Toxins		Mantis
3/5/09	R	11L	Mobile DNA in pathogenesis		Derbyshire
3/10/09	T	12D	Mobile DNA in pathogenesis		Derbyshire
3/12/09	R	13L	Environmental sensing and cell-cell communication		Mantis
3/17/09	T	14D	Environmental sensing and cell-cell communication		Mantis
3/19/09	R	15L	Virulence gene expression and regulation	20	Wade
3/24/09	T	16D	Virulence gene expression and regulation		Wade
3/26/09	R	17L	Biofilms		Mantis
3/31/09	T	18D	Biofilms		Mantis
4/02/09	R	19L	Lessons from non-mammalian systems	23	Mantis
4/07/09	T	20D	Lessons from non-mammalian systems		Mantis
4/09/09	R		No class-Spring Break		
4/14/09	T	21	Term paper 2 due.		Mantis

			<i>Presentation/critique of specific aims</i>		
4/16/09	R	22L	Combating infections: Antibiotics		Taber
4/21/09	T	23D	Combating infections: Antibiotics		Taber
4/23/09	R	24L	Combating infections: Vaccines		Mantis
4/28/09	T	25D	Combating infections: Vaccines		Mantis
4/30/09	R	26	Genomics and Systems Biology in Host-Pathogen Interactions	21	Mantis
5/5/09	T	27	<i>Presentations of research proposal</i>		
5/7/09	R		Final Term Papers Due		

*L=lecture; D=discussion of assigned papers