

# **BIOL 584 – Syllabus**

## **- Spring 2006 -**

This course will focus on mechanisms of microbial pathogenesis and the host response, and the scientific approaches that are used to investigate these processes. How do microbes adhere to host cells? How do environmental cues direct the response of microbial pathogens? How do microbial pathogens modulate host cells to expedite virulence? How do host cells respond to microbial pathogens? How does the host immune system react to microbial pathogens? What does genomics tell us about how microbial pathogens evolve? How do emerging pathogens take advantage of new ecological niches? How can microbial pathogens be thwarted? Although there are numerous microbial pathogens, the answers to these questions indicate that many pathogens use similar approaches to solve common problems.

**Student Learning Outcomes:** At the end of this course students will be able to:

- compare and contrast different microbial diseases, including the properties of different types of pathogens, and the mechanisms of pathogenesis.
- summarize the role of the host in infectious disease, including natural barriers to infection, innate and acquired immune responses to infection, and inflammation.
- compare and contrast experimental approaches for identifying virulence genes and the advantages/disadvantages of each approach for specific pathogens.
- compare and contrast therapeutic treatments for microbial infections, and distinguish when a vaccine, antibiotic, or other therapy is likely to be the most appropriate response.
- specify the role of ecology and evolution in the spread of infectious diseases, comparing the role of transmission, population size and susceptibility, and virulence in endemic disease, epidemic disease, emerging diseases, and bioterrorism.

### **Time and Place:**

Tuesday / Thursday from 2:00 - 3:15 PM

### **Instructors:**

Stanley Maloy

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### **Office hours:**

Tuesdays from 3:15-4:00 PM or by appointment; Extra office hours TBA prior to exams

**Prerequisites:**

This course will assume that you have a basic knowledge of Molecular Biology and Microbiology or permission of the instructor.

- Differences between Bacteria and Eukarya
- Features that distinguish Bacteria and Eukarya from viruses
- Central dogma (DNA replication, transcription, translation)
- Basic mechanisms of genetic regulation (repression, activation, regulation of the *lac* operon)
- Basic molecular biology tools (restriction mapping, Southern blots, DNA sequencing, PCR)
- Basic biochemistry concepts (enzymes, protein structure, Western blots)
- Basic eukaryotic cell biology (actin, phagocytosis, membranes)

**Textbook:**

Most of the readings for this course will be from online textbooks. Readings from published manuscripts and online resources will also be assigned to supplement the lecture. The readings will help you understand and be able to apply concepts presented in class but, except when specifically noted, you will not be tested on details of assigned readings that are not discussed in class. The short book "How Pathogenic Viruses Work" by Lauren Sompayrac will be required for the second half of the course.

**Website:**

Notices and supplemental materials will be posted on the BlackBoard website <<https://blackboard.sdsu.edu/webapps/login>>. Check this site regularly for updates. Sega

**Exams:**

There will be 2 midterm exams worth 100 points each and a cumulative final exam worth 100 points. The lowest score on any of these three exams may be dropped. No make-up exams will be given - if you miss an exam, that exam will be dropped.

If you believe a question on your exam was incorrectly graded, you must contact the instructor within two weeks of the day the exam was returned – no grade changes will be made after this two week window.

Use of books, notes, or calculators will not be allowed during exams. The exams will concentrate on the material covered in lectures, assigned readings, and assigned papers. The exams will be short answer format, given during the regularly scheduled class times. Answers for the midterm exams will be posted on the course website after the exams are graded.

The Final Exam will include material from the entire course. The objectives, format, and the level of difficulty will be similar to (but NOT identical to) that of the two midterm exams. Final exams will not be returned, but you may make an appointment to peruse your exam if desired.

**Pathogen projects:**

Each student will be assigned two pathogens over the course of the semester – a bacterial pathogen and a viral, fungal, or parasitic pathogen. Students will be expected to research their assigned pathogen outside of class using textbooks, web resources, and current literature. You will be

expected to prepare written responses to specific questions about your pathogen. You may also be asked to describe certain aspects of your pathogen in class. Each assignment will be worth 25 points.

**Assigned papers:**

Several published manuscripts will be assigned reading over the course of the semester. The manuscripts have been chosen to demonstrate real-world scientific problems that relate to the topics discussed in class. The manuscripts will be posted as pdf files at least one week before they are discussed in class. Each student is expected to read the manuscript and to be prepared to answer questions and participate in a group discussion. Several questions will be posed relating to each assigned paper, and similar questions may be used on the exams.

**One-minute writes:**

"One-minute writes" are short written responses to questions occasionally posed during class. Each one-minute write that you turn in will receive 1 point, whether or not the answer is correct. The important point is that you think about the question and try to answer it. However, to receive credit the 1 minute write response must be turned in before leaving class on the day the question is asked. The answers to one-minute write questions will be discussed in class, but the answers will not be returned. These points will be used as extra credit.

**Course grades:**

Course grades will be based upon a total of 250 points for exams and pathogen projects plus assigned scores for any supplemental assignments. Your course grade will be based upon a percentage of total points obtained using the following scale:

- A > 90%
- B = 80-90%
- C = 70-80%
- D = 60-70%
- F < 60%

Plus and minus grades will be assigned within the indicated ranges. The percent cutoff for a grade may be lowered based upon the course curve, but will not be raised.

**Class etiquette:**

Cell phones must be turned off during class. If you must be available via cell phone for potential emergencies, set your phone to vibrate mode. Please be considerate of your neighbors and avoid distractions such as carrying on conversations or entering and exiting during lectures.

**Studying:**

How should you study for this course? Go over your notes after each lecture while the material is still fresh on your mind. Although some memorization is invariably necessary when learning a new "language", the goal of learning is to understand the information, not to simply memorize a bunch of disconnected "facts". A major purpose of studying is to discover what you don't understand so that you can do something about it. Don't just passively read the notes, think about them and ask yourself questions about them. Do you understand what was said? Does it make sense and why? Compare

and contrast the new information with things that you have already learned. Some people find study groups very helpful for the learning process.

Keep up regularly. You can't cram all of the information into your brain the night before an exam, and we may not be available to answer your questions at the last minute. As a rule of thumb you should spend a minimum of 2 hours studying outside of class each week for every credit hour.

**Taking notes:**

We could post our lecture notes online or you could photocopy a friend's notes, but people remember better if they listen attentively and actively write down what they hear. Therefore, attending class regularly and keeping good notes is essential for success in this course. Good notetaking is an acquired skill. Don't try to write full sentences -- you will be so busy writing that you may miss the next point and your notes will be harder to study. Instead of writing down every word during lecture, write down key phrases and use short abbreviations.

**Special accommodations:**

To request disability accommodations; please make an appointment to speak with the instructor early in the semester.

**Letters of recommendation:**

Please see the online link before requesting letters of recommendation.