

Course title: Evolution of Infectious Diseases

Lecture **8:00 - 9:20 Tuesday & Thursday** Peterson Hall 110

Professor

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Instructional Assistants (IAs)

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Short Course Description

Doctors who treat infectious diseases are faced with a uniquely difficult problem since the pathogens they treat often evolve, rendering today's therapies useless tomorrow. The need to consider evolution has often been overlooked when developing treatments, however with the spread of antibiotic resistance it is now of great concern. Future medical treatments will have to include comprehensive strategies that go beyond treating disease, but also counteract the evolutionary potential of pathogens. To this end, the Evolution of Infectious Disease Course will provide a thorough review of concepts and methods in evolutionary biology, with a focus on subjects that can be used to manage disease. This course will offer a thorough review of infectious disease evolution, practice with using the newest analytical techniques to track pathogen evolution, and discussions on the latest reports of disease evolution: from breakthroughs in slowing antibiotic resistance, to the emergence of new strains of zoonotic viruses.

Course Goals

- Build a fundamental understanding of concepts and methods in evolutionary biology
- Provide background on disease evolution research and future directions in the field
- Develop analytical skills to evaluate DNA sequences and other data to study the evolution of infectious diseases

Grading

25 Percent: Weekly homework assignments

10 Percent: Lecture attendance taken by answering iClicker questions (students may opt out of this)

25 Percent: Midterm exam

40 Percent: Final exam

Lectures

Attending the lectures for this course is very important. Homework assignments and the material for the exams will be taken directly from the lectures. Given their importance, the lectures will be podcasted (<https://podcast.ucsd.edu/>). Students who attend lectures will be rewarded with points given

through i>clicker questions interspersed throughout the lectures. Simply registering an answer will give full credit. **I will drop the four lowest clicker scoring days, but no more.** If a student forgets their clicker or it malfunctions, then that lecture will be dropped as one of the four. If a student is found to have a classmate's i>clicker in addition to their own, then their points from that lecture will be revoked. i>clicker assessment begins on Thursday April 4th.

- If you do not want to attend lectures or you have scheduling conflicts, then you may opt out of i>clicker points. If you do this, your final exam will be worth 10% more.

The **TritonEd website** will be used to distribute information, collect homework, and to communicate.

Weekly homework assignments

Weekly homework assignments will be posted on the TritonEd website on Monday by 10 pm and will be due the following Monday at 10 pm. **Students that enroll late are responsible for all assignments.** Homework will be submitted through TritonEd. Please make sure that you've received a confirmation e-mail that your file was received. **If you do not receive a confirmation within 10 minutes, or have any other problems submitting your homework, e-mail it to your IA immediately.** The first assignment will be due 4/15/18, and then weekly thereafter. Your Instructional Assistant will guide you through sample problems in section that will help you answer your homework. **Late assignments are not accepted because I upload an answer key on Tuesday after the are home work is due.**

You will receive 70% credit for completing each homework problem, the remaining credit will be awarded if the answer is correct. You will not receive partial credit for wrong answers; the initial 70% is your reward for trying the problem. Homework is difficult and requires a strong understanding of the lecture material to complete.

We will drop the lowest scoring homework assignment.

Sections

Section attendance is not mandatory, but students who attend sections score on average 5% higher. This is the difference between a B+ and an A. To encourage attendance, we will award bonus points during section. Simply attending section and submitting answers to the problems discussed will award you 0.5% extra credit towards your final grade. That's 0.5% per section, a total of 4.5% if all nine sections are attended. **Bring paper to section to submit your in-class assignment on.**

section ID	day	start	end	location	IA
A01	M	12:00 PM	12:50 PM	WLH 2206	Andy
A02	M	1:00 PM	1:50 PM	WLH 2206	Andy
A03	M	2:00 PM	2:50 PM	WLH 2205	Hannah
A04	M	3:00 PM	3:50 PM	WLH 2206	Hannah
A05	M	4:00 PM	4:50 PM	WLH 2206	Sam
A06	M	5:00 PM	5:50 PM	WLH 2206	Josh
A07	M	7:00 PM	7:50 PM	WLH 2206	Josh
A08	F	11:00 AM	11:50 AM	CENTR 220	Katrina
A09	F	1:00 PM	1:50 PM	WLH 2206	Claire

Office hours

Instructors will help you with general concepts and lecture and section material, not specific homework questions, those are to be completed independently.

The following hours and locations are tentative. Please make sure this version of the syllabus is the most updated. Its version **2**, so check TritonEd for a newer version.

Day	Time	Location	IA
Mondays	5-6 pm	Humanities & Social Science (HSS) room 1145L	Sam
Tuesdays	9:30-10:30 am	Humanities & Social Science (HSS) room 1145L	Katrina
Tuesdays	10:30-11:30 am	Humanities & Social Science (HSS) room 1145L	Josh
Tuesdays	4-5 pm	Pacific Hall 3501	Andy
Wednesdays	4-5 pm	Pacific Hall 3501	Hannah
Wednesdays	11-12 am	Humanities & Social Science (HSS) room 1145L	Claire
Wednesdays	10-11 am	3218 Muir Biology Bldg.	Justin

Exams

There will be only two exams, a midterm and a final. If you have to miss the midterm, then your final will be worth 65% of your grade. No calculators or notes allowed for either exam. No one is permitted to miss the final which will be on **Thursday June 13th, 8 – 11 a.m.** If a student experiences a medical emergency and must miss the final, the student is required to submit a medical note ASAP. An incomplete will be processed and we'll work out a time post-recovery to take the exam before the end of the Fall quarter.

Academic integrity

There will be no group work for this course

- Don't use any aids during an exam
 - Don't alter a graded exam and submit for regrade
 - Don't copy another student's assignment, in part or in total, and submit it as your own work
 - Don't purchase help or assignment completion from anyone
 - Don't copy your assignment answers from the Internet or from anyone
- <http://academicintegrity.ucsd.edu/excel-integrity/define-cheating/index.html>

Schedule

April 2: Introduction to the course and the problem of evolving diseases

April 4: Introduction to the creation of genetic variation: mutation, genetic recombination, and horizontal gene transfer

April 9: Introduction to neutral genetic drift

April 11: Introduction to natural selection I: quantitative genetics

April 16: Introduction to natural selection II: population genetics

- We will not have an in-class lecture, instead I will post a podcast on TritonEd (not the normal podcast location).

April 18: Evolution of antibiotic resistance

April 23: Strategies to minimize the evolution of antibiotic resistance

April 25: Beyond antibiotics, new synthetic biology strategies to treat diseases

April 30: Genome sequencing and the elucidation of evolutionary relationships

May 2: Midterm, in class, no homework due this week

May 7: Detecting patterns of natural selection in genomes

May 9: Rapid pathogen evolution during the course of infections

May 14: Pathogen spread in hospitals

May 16: Predicting epidemic spread and viral evolution: SIR models

May 21: Gain of function mutations

May 23: Flu

May 28: HIV

May 30: Ebola/Zika

June 4: Human coevolution with pathogens

June 6: Full course review

Readings

Scientists' understanding of the evolution of infectious diseases is rapidly improving with the advent of new genome sequencing technologies. Therefore, there is not an up-to-date textbook that we can use for this course. I have, however, provided reading materials online to complement each lecture. Note that readings posted are meant to enhance your education but are not essential to read to complete homework or answer exam questions. Of course, reading this text will improve your understanding of the material and your ability to answer questions, however this is extra information not required to receive a high score.

Studying for exams

I will provide last year's midterm and final in order to help students prepare for the exams. These, combined with the homework problems and section questions are what students should focus on when studying. Next, students should review the lecture slides and podcasts.

Curving?

I do not curve the final scores or the test scores. If the average for an exam is lower than 80%, then I will add points to everyone's score to boost grades. Along these lines, I **do not round up** when computing the final letter grade. In the past, the grading scale I've used is:

A+	100% or more
A	92.5-100%
A-	90-92.5%
B+	87.5-90%
B	82.5-87.5%
B-	80-82.5%
C+	77.5-80%
C	72.5-77.5%
C-	70-72.5%
D+	67.5-70%
D	62.5-67.5%
D-	60-62.5%
F	>60%

Letter of reference policy

I am more than happy to submit letters of recommendation for students receiving an A- or higher. I receive many requests each year, so I am unable to customize the content of the letter. The letter I send emphasizes why BIEB152 students who earn a high score will excel in any future endeavor.