BIMM 124: Medical Microbiology, Winter 2018

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Lecture meets at:
Solis 107, MWF 3-3:50 pm

Dr. Gus' office hours: Thursdays 1-1:50 PM in HSS 1145L.

Website: http://ted.ucsd.edu

Instructional Assistants office hours (You may attend the office hours of any or all IAs!)

Name	Day	Time	Location
Lauren Chang	Monday	5-6 PM	Muir Woods Coffee House
Alison Vrbanac	Tuesday	2-3 PM	lobby of the Leichtag building
Ashley Gutierrez	Thursday	3-4 PM	The Loft
Hannah Tsunemoto	Friday	9-10 AM	kitchen area, 4th floor of NSB
Adrienne Terrado	Friday	2-3 PM	PC Theatre

Sections

Section	Days	Time	Location	TA	Email
A01	Wed	9-9:50 A	HSS 1305	**Hannah Tsunemoto**	htsunemo@ucsd.edu
A02	Wed	10-10:50 A	HSS 1305	**Hannah Tsunemoto**	htsunemo@ucsd.edu
A03	Wed	1-1:50 P	CENTR 218	**Adrienne Terrado**	aterrado@ucsd.edu
A04	Wed	4-4:50 P	CENTR 218	**Ashley Gutierrez**	a9gutier@ucsd.edu
A05	Wed	5-5:50 P	CENTR 218	**Ashley Gutierrez**	a9gutier@ucsd.edu
A06	Wed	6-6:50 P	CENTR 218	**Lauren Chang**	lac007@ucsd.edu
A07	Thurs	5-5:50 P	HSS 1305	**Alison Vrbanac**	avrbanac@ucsd.edu
A08	Thurs	6-6:50 P	HSS 1305	**Alison Vrbanac**	avrbanac@ucsd.edu

Introduction

The near doubling in lifespan in the past 1-2 centuries has been due mostly to our control of infectious diseases. However, they are threatening to reemerge again. **The main themes we will emphasize in Medical Micro are**:

1. How infectious agents can be beneficial or cause disease, and how our immune system responds. The response can lead to tolerance or to full-fledged biological warfare with counter measures, counter-counter measures…
2. How the scientific method is used to study host-microbe interactions and how this knowledge can be used to prevent and treat disease. Mastering the scientific method will help you outside microbiology too!

This is an active learning class that requires active participation and critical thinking skills and de-emphasizes memorization. *All exams and assignments are open book and notes.* It will require you change the way you think about science and learning. A lot of the knowledge we cover in class will be obsolete in a few years — critical thinking never will be. Memorization is a skill that got you this far. It will not get you much further. Waiting to the last minute to study for an exam may have worked before. It works poorly here, because the critical thinking skills that you need to succeed have to be developed incrementally over time; they cannot be crammed. Today is a new day!

Learning outcomes – At the end of this class you will become more skilled at:

1. knowing how microbes benefit our health
2. knowing how microbes cause disease
3. knowing how the immune system protects us

4. knowing how inappropriate responses of immune system harm us
5. knowing how microbial disease is diagnosed and treated
6. taking charge of your own learning
7. being confident in tackling new questions and challenges
8. reading and understanding primary literature; understanding the scientific method; knowing how the scientist thinks and performs research to benefit our lives. These skills will help you learn new things in biology and beyond science, empowering you to address challenges in your professional and personal lives.
9. researching and communicating about science, disease, and health. YOU can be a resource of knowledge for your family and friends in these issues.

Required materials

Textbook: *Schaechter's Mechanism of Microbial Disease, 5th Edition*. Note: the exams are open book but closed computer, so **possession of a hard copy of the book is needed**. Copies have been placed on reserved in the Biomedical Library.

We encourage you to delve deeper as your time, curiosity, and necessity permits. To assist you, UCSD has other textbooks online that you can access; there are links on the class web site. If you find something confusing in *Schaechter*'s, you can turn to another resource, such as *Sherris Medical Microbiology, Levinson's Review of Medical Microbiology and Immunology* or others, available free online via the UCSD library (use a VPN on your personal computer for access).

Papers assigned for lecture will be posted in the "Lecture materials" folder on TED. You will need to print out all assigned papers and bring them with you to class, and to your exams.

Clickers (basic iClicker is fine) are **required for this class**. Register your clicker under "tools" on the TED BIMM 124 website. DO NOT REGISTER ON THE ICLICKER WEB SITE. We cannot look up rubbed-out clicker numbers for you. If you cannot read the code on the back of your clicker, you can either retrieve it from iclicker website (if you've registered it there before) or buy another one.

How we will achieve the aims of this class:

1. **Readings (textbooks and primary literature)**: Mandatory reading must be completed *before* each lecture.

Textbook: Your textbook provides foundational information for class, *e.g.* information about the immune system, disease symptoms, mechanisms of pathogenesis and protection. Textbook readings lay the foundation for our lectures. Prior reading of the textbook material **before** lecture **is required** in this class and will serve as the starting point for our discussions. Unlike many other classes you have taken, the instructor will not focus on explaining what was in the textbook readings. Rather the readings will serve as a starting point for discussions in class, delving into much more interesting and applied topics. If you have not done the reading, you will not be able to follow the lectures or participate in the discussions. *We recommend that you do all your readings in groups.*

Remember, the exams are open-book. You do not have to read to memorize, you need to read to comprehend the background for class. Although you do not have to memorize, you still have to have a working knowledge of what is in the readings and have a prior understanding of it in order to complete the exams… "Read before to soar." This is an opportunity to take charge of your own success.

Primary literature: The second of the two lectures on each pathogen will focus on primary literature relevant to that pathogen (*e.g.* how it causes disease, interactions with the immune system, animal models of disease, etc.). Virtually everything we know about immunology and microbial pathogenesis is based on published research. This takes you right to the "fountain of scientific knowledge." Further, by delving into primary literature, your **critical thinking skills** will grow like on steroids. This is one of the most important skills we can teach you—a skill you can apply long after UCSD, in professions such as medicine, research, pharmacy, industry, law, journalism, politics, economics... It will enrich your life in many ways.

Each week, you will have 1-2 papers to prepare and discuss in lecture and sections. As with textbook readings, these must be done **before** lecture. This preparation is essential for the paper to make sense and for you to learn how to read, think

about, and work with research literature. Knowing how to do this affects a significant part of your grade, since you will use these tools for your "Final Paper" and on the exams. We want to give you ample opportunity to practice and succeed. "Read before to soar." This is another opportunity to take charge of your own success. *We urge you to do all your readings in groups.*

WHY DO WE REQUIRE READINGS BEFOREHAND? AND WHY WILL WE NOT SIMPLY BE LECTURING FROM THE READINGS AS IN MANY OTHER CLASSES? We assume you are here to learn. Just like athletic training for your body, learning requires **effort**. If the lecture simply rehashes the readings, we will be spoon-feeding you, robbing you of the valuable opportunity to improve your learning and critical thinking skills. For a college senior, preparing for imminent entry into the real world, this would be a disservice. Did you know that focusing on higher level learning skills results in brain development? Research shows this! BIMM 124 is a weight-lifting class for your brain. No one else can do the exercising for you. If you do it, your "thinking muscles" will grow and so will your success in life. Our goal is your success. We are equipping you to change the world!!!

2. Reading quizzes. Each class will begin with a 3-question multiple choice clicker quiz. The goal of this quiz is to give you added incentive to do the reading ahead of time. The class quiz will be strictly on basic understanding of the readings. Our expectation is that >75% of the class will get the answers right, provided they have done the readings. These questions will be shown on slides framed by an **orange** box. (See below for grading.)

3. Interactive lectures with additional clicker questions. These form the "meat" of each class. Dr. Gus will pick a few topics from the readings and write multiple-choice questions that require deeper thinking/cognitive analyses. You will click in to vote on an answer based upon your initial impression. Many of these questions you will not get right the first time around. Then, you will work in assigned groups to discuss the question for a few minutes, followed by a second opportunity to click in based upon your group's consensus. The slides with these questions will be framed by a **green** box. (See grading below.) From here, we will have in-class discussions as to what the right answer is and what's behind it. The goal of these sessions is to actively engage and empower you in YOUR learning process. Our goal is to help you develop your mind and thinking capabilities so that you will be academically and professionally successful. Our goal is your empowerment!

If you do not do the reading before coming to lecture, you will be very bored because you will have nothing to do. Further, you will have let down your group members, who depend on one another to come to class ready to work together.

Note on clickers: The primary impetus for using clickers is not to force attendance. Rather, the goal is to promote participation in class, reading ahead of time, and your success and learning.

4. Sections. Sections are mandatory and play a significant role in reinforcing and strengthening your analytical skills. This is where your "Section Papers" are discussed and graded. You must be present to receive a grade on your Section Papers, which can help your course grade. Section papers are excellent practice for classroom discussions, for your exams, and for your Final Paper … another opportunity to take charge of your success. On days when there is no Section Paper, the discussion section will give you the opportunity to practice exam questions (VERY helpful activity) and to clarify concepts from the readings and lecture.

5. Multimedia. There are two films and one podcast required for this class:

- The 1-hour film, *Hunting the Nightmare Bacteria*, will be shown in class on Mon, Feb 12. It is also available online; there is a link on course web site. It will be covered on the midterm.
- The 35 minute podcast, *Threat of a Post-antibiotic Era*, is linked on the course web site. Students are required to listen to this podcast on their own time. It will be covered on the midterm.
- The 1.5-hour film, *TB – The Silent Killer*, is linked on the course web site. Students are required to watch to this film on their own time. It would be most beneficial to watch this film over the Feb 17-19 holiday week-end, in preparation for the Feb 21 lecture on TB by Timothy Rodwell. It will be covered on the final exam.

How you will be evaluated

1. **Clickers**, **10%** of your grade:
   a. **Orange box (quiz) questions** = 5% of your grade. Get 73% of these questions correct to get full credit for the quarter. Get 50% of these questions correct to get half credit for the quarter. These are the only possibilities.
   b. **Green box questions** = 5% of your grade. It does not matter whether you get these right or wrong. Participating in 75% of these questions during 75% of the lectures gives you full credit for the quarter. No partial credit.

   Most students will have a legitimate excuse for one or two unavoidable absences during the quarter. This is already factored into the grading scheme for clicker points, and it is why you do not have to be there every day to get full credit. DO NOT ASK TO MAKE UP CLICKER POINTS IF YOU ARE ABSENT, EVEN IF YOU ARE ABSENT FOR A GOOD REASON. If you are not in class, you do not get points. And that is OKAY.

   Clicker scores will not be posted on TED. The answers to the quiz questions (orange box questions) are announced in class. If you want to keep track of your performance on quiz questions you should keep a record of your answers in your notes. The slides are posted after each lecture on TED. You may also keep track of your responses to the green box questions and compare them to the total number of questions asked. Again, you will find the questions among the slides on TED.

2. **Section Papers**, **optionally 10%** of your grade: There are three optional write-ups on primary literature due in Section. Instructions will be given with each paper and write-ups are to be no longer than 1 page in length. You can read and discuss these research papers in groups, but you must then write up your own answers individually. It is critical that your responses be formulated in your own words, that you NOT copy sentences or phrases from the published paper. Your written response will be submitted to Turnitin through TED, to check for plagiarism. Bring a hard copy of each write-up to section, where it will be discussed and graded. You must be present in section to get credit for your Section Paper.

   The questions in these assignments will be similar to those on the exams and Final Paper and are, therefore, *good, low-stress practice for both*. However, the material in these research papers will NOT be covered on the exams (because they are "optional").

   For each Section Paper, you may receive:
   - "S" (satisfactory) 1 full point
   - "I" (improvement needed) ½ point
   - "N" (no credit) 0 points

   At the end of the quarter, if your Section Paper total score is:
   - ≥2 points, then 10% of your final grade is an A (100%)
   - <2 but ≥1 point, then 5% of your final grade is an A (100%). The other 5% of credit will transfer to your final exam score.
   - <1 point, all of the 10% of credit will transfer to your final exam score.

3. **Exams**. There are two exams in this class:
   - **midterm** on Tuesday, Feb 13, 8:00-9:50 PM (outside regular lecture time!)
   - **final exam** on Wed, Mar 21, 3-6 PM

   Both exams are cumulative, *open book, and open notes*. No electronic media (cell phones, computers, calculators, etc…) are allowed. Exams emphasize problem-solving skills and being able to analyze and extrapolate information from readings. The information in the section papers is not included on the exams (because they are "optional), but the research article for the Final Paper WILL be covered on the final exam (because it is "required"). You will have opportunities to practice sample exam questions in weekly sections.

   The **midterm** is worth **15%** of your grade, but that 15% will be replaced with your final exam score if you do better on the final (most students do). The midterm is a low pressure opportunity to practice for the final. If you miss the midterm, the credit reverts to the final exam.

   The **final exam** is worth **40-50%** of your grade **depending on whether you get credit for section papers**.

The exam scores will be normalized, against the top 15 grades in the class. In other words, your grade will be your score as a percentage of the average of the top 15 scores. For example, let's say the average of the top 15 scores is 90 out of 100 points, and your raw score is 75 points. Your normalized score will be 75/90 = 83%.

There is no re-grading of the exams, except for incorrect addition of points.

We realize you may have many finals. Please look at your finals week schedule now. If the timing of this final conflicts with other finals, then you need to drop one of the conflicting courses. Writing a fair exam for this class takes a lot of time and effort. Therefore I can write only one version of the exam. To be fair to everyone, I regret I can only offer the final at the time scheduled, except under extraordinary, documented circumstances (*e.g.* documented illness that requires hospitalization), and I must be notified of that extraordinary circumstance *prior* to the final (unless you are unconscious!).

4. The **Final Paper** is an analysis of a primary research article, due at the START of lecture on **Monday, March 5**, and is worth **25%** of your grade. The format of this paper and what will be expected from the students will be made explicitly clear when the paper is assigned. The prompt will be similar to the section paper assignments leading up to this. *You are to work on this individually*, not in groups, and are expected to do your own thinking and writing. We use Turnitin to detect plagiarism, which will be treated as a breach of academic integrity.

   The material in this research paper WILL be fair game on the final exam (because this is "required" work).

   To get full credit you *must* hand in your assignment on time. If you submit it late, there will be several unavoidable consequences. One is, we may not be able to find time to grade it (which would result in a zero), because we have scheduled readers with limited time to grade these. The second is your peers will justly complain that it is unfair you got more time. The third is your peace of mind will probably suffer since you will be piling on your workload before/during finals week. If, for some reason outside your control, you cannot meet this deadline, please email Dr. Gus before the due date. There is are no re-grades of the Final Paper.

Grades

The class will be graded on a standard scale (not on a curve) so that everyone has the opportunity to achieve a high grade. There will be pluses and minuses.

Course grades will be assigned as follows:

A	87-100%
B	77-86%
C	64-76%
D	50-63%.

Note that the vast majority of students do better on the final exam than they do on the midterm. In this scenario, your final exam grade will replace your midterm score!

Academic Integrity

Academic dishonesty undermines the hard work of all students in the class who take responsibility for their learning. Academic dishonesty is incompatible with science and the search for truth. We do not tolerate it. Out of respect and appreciation for your own efforts, nor should you. We encourage you to talk with any of the BIMM 124 teaching team if you learn of any incidents of academic dishonesty. If we suspect cheating, the case will be referred to the Office of Academic Integrity, who will contact the offending student's college dean. Academic dishonesty includes:

- clicking in for another student, or having someone click in for you
- copying from another student's paper or from any other source
- cheating on an exam

Each student is responsible for knowing and abiding by UCSD's policies on Academic Dishonesty:
https://senate.ucsd.edu/Operating-Procedures/Senate-Manual/appendices/2

Each student is responsible for knowing and abiding by UCSD's Student Conduct Code:
https://students.ucsd.edu/sponsor/student-conduct/regulations/22.00.html

Any student violating UCSD's Academic Dishonesty or Student Conduct policies will earn an 'F' in the course and will be reported to their college Dean for administrative processing. Committing acts that violate Student Conduct policies, resulting in course disruption, may be cause for suspension or dismissal from UCSD. Use of two or more clickers in the class (i.e. clicking in for someone else or having someone click in for you), plagiarism, and cheating on exams will be treated as violations Student Conduct Policies.

Class etiquette

Come on time. Be present. Turn cell phones off. Focus your laptop on class material.

Texting, surfing, etc… is disruptive to the students around you.

How to succeed in Medical Microbiology

1. Spend the 8-10 hours/week reading and studying outside of class, as is expected for a four-unit course.
2. Come to class prepared, having done the assigned readings prior to the lecture. "Read before to soar." Students who do the work and come prepared to class do better. Period.
3. Click in during lecture. Participate in lectures and sections. We have run the statistics. Students that participate in class and in section statistically do better than those that do not.
4. Ask questions whenever something in not clear, before/during/after class, during instructor office hours (please come!), during IA office hours, and in sections.
5. Do all the Section Papers. Whether you get "S" or not, you will learn a lot in the process. Even if you have already gotten credit for two papers, doing a third paper, just for the practice, will further strengthen your analytical skills and empower you to excel on the final exam and final paper.
6. **Study in groups**. Read the textbook in groups. Read the papers in groups. Reading primary literature by yourself is challenging to say the least. It is better in groups. Be a groupie! You learn more from your peers than from instructors. To help, we will arrange assigned groups in section.
7. Talk with the instructor and/or your IA's about any challenges you are having with assignments, with understanding the material, with reading primary literature, with problem-solving techniques. We know this is not easy. Let us know right away how we can help you learn.

Sections	Monday lecture	Wednesday lecture	Friday lecture
Set up groups; Prepare for writing papers	**Jan 8** **Intro to med micro** **Course logistics**	**Jan 10** **1. Finish intro to course** **2. Innate Immunity** **pg 66 – top of 85**	**Jan 12** **Innate Immunity** **pg 85-90, 2nd column of pg 184 (survival of …)**
Review; Exam prep	**Jan 15** **HOLIDAY**	**Jan 17** **Innate Immunity** **Brinkmann 2004**	**Jan 19** **Adaptive Immunity** **pg 91- top of 110**
Section paper #1	**Jan 22** **Adaptive Immunity** **110-116**	**Bacteria intro** **Jan 24** pg 18 to top of 26 (before "Cytoplasmic membrane"), pg 29 ("Capsules, Flagella…), pg 31, and box on pg 172	**Jan 26** **Secretory diarrhea** **Chpt 16**
Review; Exam prep	**Jan 29** **Secretory diarrhea** **Kamada 2012**	**Jan 31** **Staphylococcus** **Chpt 11**	**Feb 2** **Staphylococcus** **Inoshima 2011**
Section paper #2	**Feb 5** **Microbiota** **Chpt 2** **Rob Knight**	**Feb 7** **Chlamydia** **Chpt 27**	**Feb 9** **Chlamydia** **Nelson 2005**
Review; Exam prep	**Feb 12** **Film: Hunting the Nightmare Bacteria (PBS – Frontline)**	**Feb 14** **GI protozoa** **pages 521-527** **Sharon Reed**	**Feb 16** **GI protozoa:** **drug development** **Debnath 2012**
Section paper #3	**Feb 19** **HOLIDAY**	**Feb 21** **Mycobacteria** **pages 257-266** **Timothy Rodwell**	**Feb 23** **Virus intro** **Chpt 31**
Review; Exam prep	**Feb 26** **Influenza** **Chpt 36**	**Feb 28** **Influenza** **Gao 2013**	**Mar 2** **Viral hepatitis** **Chpt 43**
Review; Exam prep	**Mar 5** **HIV** **Chpt 38** **FINAL PAPER DUE IN CLASS!!!**	**Mar 7** **HIV** **Hatziioannou 2009**	**Mar 9** **Schistosoma, Malaria, Trypanosoma cruzi** **506-512, 517-519, 546-548** **Jim McKerrow**
Review; Exam prep	**Mar 12** **Malaria** **Villarino 2016**	**Mar 14** **Host-pathogen interaction: Tolerance** **Janelle Ayres** **Ayres & Schneider 2012**	**Mar 16** **Vaccines** **Chpt 45**