

BIMM124: Medical Microbiology, Fall 2011, UCSD

Drs. Raffi Aroian and Cindy Gustafson-Brown

Office: 4430 Bonner Hall

Class meets at:

Solis 107

MWF 11:00 – 11:50 am

For Dr. Aroian

Office hours: Wednesday and Thursdays from 1:00 – 1:45 pm, Bonner Hall 4146; if no one shows up in the first 5-10 minutes, they will move to my office 4430 Bonner Hall.

(858) (82)2-1396; medmicro1@gmail.com (only valid email for this class; do not use my UCSD address if you want me to read and respond to your email)

For Dr. Gustafson-Brown

Office hours: Tuesday 11:30-12:30 , HSS 1145E; also by appointment.

(858) (53)4-4242; cgb@ucsd.edu (please put BIMM124 in the subject line)

class website: <http://ted.ucsd.edu>

Class Teaching Assistants (TAs)

Jillian Sesar	jsesar@ucsd.edu	Grad
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TA Office hours to be posted by Monday, September 26

Thirty five hundred years ago, the mean life expectancy of human beings was 28. Now, it is closer to 82. Think of what your life would be like if it were the former. This dramatic increase in life expectancy is in no small part due to changes in human hygiene, behavior, and therapeutics that promote health and safety from pathogenic (disease-causing) microbes (e.g., bacteria, viruses, fungi) and parasites (e.g., worms). Hence the quote, "If you have your health, you have everything."

The main themes and ideas we will emphasize are:

1. The interaction of microbes/"pathogens" with our immune system and how either the microbes or the immune system can each be beneficial or harmful, depending upon the circumstance
2. How we learn about host – microbe and host – pathogen interactions using the scientific method; how this applies to science and how it can apply to improving your life
3. How we use the information garnered from the scientific method to develop cures for disease and to delve deeper into the mysteries of life

The big picture is:

The interaction of microorganisms with the host (i.e., us) is complex and can be detrimental or beneficial and 1. knowledge of host-microbe interactions and 2. knowledge of the means used to study host-microbe interactions can be used to dramatically improve our lives.

The main questions we are interested in are:

1. how microbes cause disease
2. how microbes can be beneficial

3. how immune system defends us
4. how the immune system causes disease
5. how we learn about things in science
 - what is the scientific method
 - how can we apply scientific method to every day life
 - how we use the scientific method to improve health and the world around us

Outcomes-- At the end of this class you will become more skillful in:

1. understanding how microbes and the immune system interact
2. understanding the nature of microbial disease
3. understanding how microbial disease is diagnosed
4. understanding how microbial disease is treated
5. reading & understanding primary literature and scientific method
6. knowing how scientific information is “learned” (the scientific method)-- how the scientist thinks, problem solves, and performs research to study microbe – host interactions in ways that greatly benefit our lives. These problem-solving skills will also hold you in good stead in helping you solve challenges that come up in your professional and personal lives.
7. synthesizing research knowledge to learn new & meaningful things regarding host-pathogen interactions
8. taking knowledge and determining what the next steps are to deeper learning
9. researching and communicating to others about microbial pathogens and their impact in the world. When the next epidemic comes out, YOU will be in position to learn about it, what it means, how serious it is, and what the options are and to communicate this to friends and family
10. independent learning, thinking, and research

Without doubt, this class covers some of the most fascinating and relevant subject matter to humans.

This class requires your active participation. It is likely different from classes you have taken in the past in that it emphasizes learning skills and not memorization. *All exams and assignments are open book and notes.* It will require you change the way you think about science and learning. For example, even the most recent textbooks (including yours) discuss macrophage-derived granulomas formed by the host (infected person) during infection by *Mycobacterium tuberculosis* as protective against bacterial damage. The protective nature of granulomas has been the dogma for years. Current research now suggests this conclusion is wrong- granulomas, which appeared to be a protective response, we now understand are means by which the bacteria replicate and spread.

Required materials:

Textbook 1: Schaechter’s Mechanisms of Microbial Disease, 4th Edition; note the final exam is open book but closed computer so *possession of a hard copy of the book is required*. Copies have been placed on reserved in the Biomedical Library.

Textbook 2: Sherris Medical Microbiology 5th Edition; available free via UCSD proxy (print out what you need for the exam) <http://www.accessmedicine.com/resourceTOC.aspx?resourceID=656>

Clickers (iclicker). Register your clicker under the tools under the Ted website. Note we do not look up rubbed-out clicker numbers for you. If you cannot read the clicker number on your clicker, you can either retrieve it from iclicker website (if you’ve registered it there in the past) or will need to buy another one.

Computer and printer is required for downloading assignments, relevant on-line chapters, etc...

How we will achieve the aims of this class:

1. Textbook readings: Textbooks will provide foundational information for each pathogen we cover, e.g., general pathological mechanisms, clinical manifestations (symptomology), epidemiology, immunological interactions. This information will be covered in the first of two lectures for each pathogen (4 bacteria, 3 viruses, and 2 eukaryotic pathogens). Each week you will be assigned readings from one or both textbooks. These lay the foundation for our classroom interactions, which will also bring in other sources such as information from reviews or primary literature. Prior reading of the textbook material before you come to class is required in this class and will serve as the starting point for our discussions. Class time will be more than a recapitulation of the textbook readings, it will cover deeper aspects of each pathogen.

Taking this class means you agree to do the readings upfront. If you have done the readings before class, you will come in prepared for deep learning and for success in this class. If you do not do the readings before class, you will likely have difficulty in the class. Remember, the exams are open book. You do not have to read to memorize, you only need to read to comprehend and get a good background for class. *We highly recommend that you do all your readings in groups.*

2. Primary literature readings: The second of two lectures for each pathogen will focus on primary literature relevant to that pathogen. Virtually everything we know about microbial pathogenesis is based on research published in primary literature. Understanding “how we know” and “how we learn” about things biological is one of the most important skills we can teach you since you can apply this skill long after you leave UCSD in medicine, research, pharmacy, industry, law, journalism, politics, economics. It will enrich your life in many ways.

Each week, you will have 1-2 primary literature readings to prepare and discuss in class and sections. These primary literature readings will encompass some important themes regarding microbial pathogenesis and interactions with the immune system. In general, we will cover the introduction (which includes the scientific method for each paper) and a significant portion of the results section of each paper, as well as discuss the relevance of the conclusions and where we might go with the research.

As with textbook readings, by taking this class you agree to do the primary literature readings ahead of time. This preparation is essential for you to learn how to read, think about, and work with research literature. Knowing how to do this influences a significant part of your grade since you yourself will use these tools for your “Final Paper”. In addition, you will need this skill on the exams. We want to give you ample opportunity to practice to succeed. *We highly recommend that you do all your readings in groups.*

You will also be assigned parts of three papers to discuss and present on in your sections (“Section Papers”). For these assignments, you will work in study groups from your sections to read and analyze the paper and then individually write-up brief, one-page answers to the questions regarding these papers. These play a role in your grade as outlined below.

3. Interactive classroom sessions that involve the use of iclickers and in-class discussions in which you (alone and in small groups) will be given a challenging question or scenario and work your way

through to a solution (usually indicated by clicker voting). iclickers will also be used to help us assess the comprehension of readings and materials, showing areas where more attention is called for. They may also play a positive role in your grade, if you so choose.

4. Sections. Sections are mandatory for this class and play a significant role in reinforcing and strengthening your analytical skills. Sections will cover new material required for the final exam and final paper and not covered during regular lectures. They are also where your Section Papers are discussed and graded. You must be present to receive a grade on your Section Papers. In section you will also find your study group that you will work with on primary literature readings (e.g., Section Papers) and your debate presentation.

To enroll in section, go to <http://sections.ucsd.edu/>. There is a limit of 30 students per section. Enrollment starts the first day of class at 6 pm and continues for one week (September 30, 6 pm).

Sections are:

- A01, Monday 1-1:50 pm, AP&M 2301
- A02, Monday 2-2:50 pm, AP&M 2301
- A03, Monday 3-3:50 pm, AP&M 2301
- A04, Wednesday 4-4:50 pm, AP&M 2301
- A05, Wednesday 5-5:50 am, AP&M 2301
- A06, Wednesday 6-6:50 pm, AP&M 2301
- A07 Friday 9-9:50 pm, Sequoya 147
- A08 Friday 10-10:50, Sequoya 147

How the class will be evaluated:

1. Exams. There are two exams in this class, a take-home midterm and an in-class final exam on Tuesday, December 6, 11:30am - 2:30 pm. Both are cumulative, open book, and open notes. No electronic media (cell phones, computers, calculators, etc..) are allowed. They will emphasize problem-solving skills and being able to think about and extrapolate information from readings. Both will be in the same format. The midterm will be graded and handed back to you. This grade will give you an idea of the grade you are receiving in the class. The midterm exam grade will be replaced by the final exam grade after the final has been taken. The final exam is worth **46-70% of your grade**, depending upon your own choices. A final worth ~50% of your grade is normal for most classes. Thus, depending on your choices, the final is worth no more than any other class you are likely to take. The advantage of having this system is that the midterm is in essence a practice final exam in which you can experience what the final exam is like without the pressure of having it count. Our goal- optimize your chances of success.

The final will be graded on a standard scale (not on a curve) so that everyone has the opportunity to achieve a high grade and so that the final exam does not become a competition. To help achieve fairness (e.g., in the event the final exam turns out to be more difficult than anticipated), 100% on final exam will be normalized to the average of the top 10 grades in the class. There is no regrading of the final exam except where incorrect addition of points in the exam resulted in an incorrect score.

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 either drop the conflicting class or this class. Writing a fair exam that tests problem solving abilities and the skills we are looking to develop in class takes a lot of effort. Therefore there are no make-up finals and no early finals. Due to the constraints of so large a class and our ability to write and grade the final, to get credit for the final exam you must take it at the scheduled time 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. Makeup finals may be an oral presentation to the instructor.

2. Final Paper on a piece of primary literature due on the final week of class. **30% of your grade.** The format of these papers and what will be expected from the students will be made explicitly clear when the papers are assigned on Nov 7. You are to work on these individually and are expected to do your own thinking and writing. They are due in class on Nov 28 (3 weeks later) and will be graded (standard letter grade, not curved) according the handout that will accompany them (similar to your primary literature paper assignments leading up to this). To get full credit for your work you must hand your assignment in on time. If you hand them in 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 time to grade these and cannot let the grading go into finals week. The second is your peers will (justly) complain to us that it is unfair that someone got to hand their paper in late when they handed theirs in on time. The third is your education and peace of mind will probably suffer since you will be piling on your workload before finals week. If, for whatever reason, you cannot meet this deadline please email your section TA and me before the due date. There is no regrading of the Final Paper.

3. Clickers, optionally 14% of your grade: At the very beginning of each lecture (11 am promptly) we will present a few multiple, choice questions that test your comprehension of the reading material (textbooks and primary literature). This will help you and the teaching team gauge the level of reading comprehension. In addition, during lecture we will present multiple-choice questions that will challenge your thinking and comprehension of material just presented and that provide opportunities for problem solving on a smaller scale, individually and in groups. These questions will also provide important and immediate feedback to us as to how the learning process is progressing.

By answering 70% of the clicker questions (right or wrong, it doesn't matter), you will receive 7% of your grade as an A. Below this level of participation, you will receive no credit and instead that 7% of your grade will be switched to the final. The idea is encourage active in-class learning—showing up, thinking about the problems, and participating in problem solving. This approach is also true to science itself, which is a dynamic and participatory process, not an isolated one or one that is carried out via mass media. Needless to say, use your own clicker only (see Section on Academic Integrity).

With regards to the reading comprehension questions at the beginning of lecture, we will assign an additional 7% of your grade as an A if you answer 70% of the questions correctly. Thus, if you come prepared to lecture and participate, 14% of your grade will be assigned an A.

4. Section Papers, optionally 10% of your grade: There are three write-ups on primary literature due in Section, graded in section, and discussed in section. These will be written up according to instructions given with each paper and are to be no longer than 1 page in length. You are to work on reading and discussing these assignments in your study groups (assigned in section) and then write up your own answers individually. The reason for working in groups is that experience has shown that students learn more about reading, interpreting, and understanding primary literature when in a group. You are to bring your write ups to section, where they will be discussed and graded. You must be present in section to get credit for your Section Paper. For each Section Paper, you will receive either an "S" (satisfactory), "I" (improvement recommended), or "N" (not done). The questions for these papers will mirror those in the exams. For each S you receive, you receive 1 full point. If at the end of the quarter you have accumulated 2 or more points, then 10% of your grade is assigned an A. If you have accumulated 1 point, then 3% of your grade is assigned an A. For each "I" you score, you

will receive $\frac{1}{2}$ a point. Two such scores will add up to 1 point ($1\frac{1}{2}$ points at the end counts as 1 point; $\frac{1}{2}$ point at the end counts as 0). If you receive less than full credit for your Section Papers (e.g., 0% or 3%), that remainder of the 10% will transfer to your final. In general, to get an “S” you must receive a 70% or greater on your Section Papers.

Thus, if you both do clickers and pass your Section Papers, then you will have 24% of your grade already as an “A” and your final will be worth 46% of your grade. The remaining 30% is from your final paper. In this way, you are empowered to take control of your learning and your grade.

Instructor/instruction evaluations: Periodically, students will be asked to fill out evaluations on index cards at the end of class to help us evaluate the effectiveness of instruction and the instructor.

Grades

Course grades will be assigned as follows:

A: 85-100%; B: 75-85%; C: 60-75%; D: 45-60%.

Academic Integrity: Academic dishonesty undermines the hard work of all the students in the class who are engaged in the learning process and who are taking responsibility for their learning. It is also incompatible with the practice of science and search for the truth. We will not tolerate it. Out of respect and appreciation for your own efforts, you should not tolerate cheating among your colleagues either, and we encourage you to talk with any of the BMM124 staff if you learn of any incidents of academic dishonesty. If we suspect dishonesty, we will meet with you to discuss my concerns, and we will report the incident to the Office of Academic Integrity, who will contact your college dean. The following is an excerpt from the UCSD General Catalog on Academic Dishonesty: “Each student is responsible for knowing and abiding by UCSD's policies on Academic Dishonesty and on Student Conduct. Any student violating UCSD's Academic Dishonesty or UCSD's 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 that result in course disruption are cause for suspension or dismissal from UCSD.” Use of two or more clickers in the class (i.e. clicking in for someone else) will be treated as a violation Student Conduct Policies.

How to succeed in this class:

1. spend the 8-10 hours outside of class time expected for this class. Read the textbook and papers before class (~6-8 hr) and prepare for sections (readings, Section Papers) (~2-4 hr). Students who do the work and come prepared to class do better!
2. attend lectures and attend sections. we have run the statistics. Students that are present in class and students that are present in section statistically do significantly better than those that are not.
3. ask questions whenever something is not clear, either before/during/after class, during our office hours (please come!), during TA office hours, in sections.
4. participate with your clicker, be interactive with the material
5. do all the assignments—do the Section Papers. Whether you get “S” or not, you will learn a lot in the process. Take the Midterm. It will challenge and stimulate your learning and give you excellent practice for the final.
6. talk with the instructors and/or your TA's about any difficulties you are having with assignments, with understanding the material, with reading primary literature, with problem solving techniques. Let us know as soon as you are able how we can help you learn.

7. **Study in groups.** Reading primary literature is challenging when you are not used to it. I strongly urge you to read and discuss the papers you are reading in groups. These groups will be set up in the first full week of class in sections.

CLASS ETIQUETTE

1. The best place for learning is up front in the active learning zone.
2. Come on time. If you come late, please sit in the back so as to not disturb others.
3. Be present in the class. That means all cell phones off, please. No texting, no phone calls. It is disruptive to other students and to your instructors.

Medical Microbiology Class and Section Schedule, Fall 2010; all readings and assignments subject to change; SMMD = Schaechter's Mechanisms of Microbial Disease; Sherris = Sherris Medical Microbiology

Date/Lecture topic/Instructor	Readings	Section topic for week	Assignment-- available on website by 9 pm Thursday
September 23 (M); logistics; RA & CGB	N/A	Sign up for section	None; Damage-response framework
Sept 26 (M); Introduction to Infectious Diseases; RA Sept 28 (W); Normal flora and maintaining symbiotic host-microbe relationships; RA Sept 30 (F); Innate Immunity I; RA	SMMD: Chapters 1-2; Chapter 3 pp. 18-27 Cash et al. paper SMMD: Chapter 6	Study groups assigned; Damage-response framework	Paper section write-up; due in Sections next week
Oct 3 (M); Innate Immunity II; RA Oct 5 (W); Adaptive Immunity I; CGB Oct 7 (F); Adaptive Immunity II; CGB	Paper figure TBD SMMD: Chapter 7 Paper TBD	Review/grade section write-ups	SMMD: Chapter 8 or Techniques
Oct 10 (M); Staphylococcus foundation; CGB Oct 12(W); Staphylococcus primary literature; CGB Oct 14(F); Chlamydia foundation; RA	SMMD: Chapter 9 Sherris: Chapter 24 Paper TBD SMMD: Chapter 27 Sherris: Chapter 39	Parasite's Way of Life or Techniques	SMMD: Chapter 45
Oct 17 (M); Chlamydia primary literature; RA Oct 19 (W); Mycobacteria (TB) foundation; RA Oct 21 (F); Mycobacteria primary literature; RA	Paper TBD SMMD: Chapter 23 Sherris: Chapter 27 Paper TBD	Vaccines	Paper section write-up; due in Sections next week

Oct 24(M); Helicobacter foundation; CGB	SMMD: Chapter 22 Sherris: pp 573-577	Review/grade section write-ups	Midterm; due in class October 31
Oct 26(W); Helicobacter primary literature; CGB	Paper TBD		
Oct 28(F) catch up; fun lecture			
Oct 31 (M); Intestinal helminths foundation; RA	SMMD: Chapter 54 Sherris: Chapter 53	Review midterms	SMMD: Chapter 45
Nov 2 (W) Intestinal helminths primary literature; RA	Paper TBD		
Nov 4 (F) Viral pathogenesis I; CGB	SMMD: Chapter 31		
Nov 7 (M) Viral pathogenesis II; CGB	Sherris: Chapter 7	Vaccines	Paper section write-up; due in Sections next week; Final Paper announced November 7th
Nov 9 (W) Influenza foundation; RA	SMMD: Chapter 36 Sherris: pp 167-177		
Nov 11 (F) holiday			
Nov 14 (M) Influenza primary literature; RA	Paper TBD	Review/grade section write-ups	None
Nov 16 (W) Arboviruses foundation; CGB	SMMD: Chapter 33 Sherris: pp 279-292		
Nov 18 (F) Arboviruses primary literature; CGB	Paper TBD		
Nov 21 (M) HIV foundation; CGB	SMMD: Chapter 38 Sherris: Chapter 18	No sections; Thanksgiving break	None
Nov 23 (W) HIV special call in to Africa	Not to be missed!		
Nov 25 (F) Thanksgiving break			
Nov 28 (M) HIV primary literature; CGB	Paper TBD	General review	Final Paper due in class November 28.
Nov 30 (W) Guest lecture	TBD		
Dec 2 (F) Class wrap-up			