BIMM124: Medical Microbiology, Fall 2012, 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: Fridays October 12, 19, 26, Nov. 2, 9 from 1:00 – 1:50 pm; 2:00 – 2:50 pm, York 3010.
(858) (82)2-1396; prof.raffi@gmail.com (**only** valid email for this class as I am likely to miss your email if you send it to my ucsd email)

For Dr. Gustafson-Brown
Office hours: Wednesdays 12:15-1:15PM (during teaching weeks) , 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)

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TA Office hours to be posted by Wednesday, October 3

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 discover 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 and the lives of others.

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. being empowered to learn on your own and in groups
6. reading & understanding primary literature and scientific method
7. 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.
8. synthesizing research knowledge to learn new & meaningful things regarding host-pathogen interactions
9. taking knowledge and determining what the next steps are to deeper learning
10. 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
11. 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: Murray et al. Medical Microbiology, 6th 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.
Other electronic textbooks will be posted on ted.ucsd.edu so that you will have handy some excellent alternative resources to help you understand the material. One particular additional textbook we recommend is Sherris Medical Microbiology 5th Edition; available free via UCSD campus or vpn.
http://www.accessmedicine.com/resourceTOC.aspx?resourceID=656

Clickers (basic iclicker). **Required for this class**. 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. **Readings (textbooks and primary literature)**: Mandatory before each class. Taking this class means you agree to do the readings upfront.

Textbook: Your textbook provides foundational information for class, *e.g.*, general topics such as introduction to bacteria, immunology and specific topics such as pathological mechanisms, clinical manifestations

(symptomology), epidemiology, immunological interactions for specific pathogens. Readings 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. Unlike many other classes you take, we will not be using valuable lecture time to go over basic definitions and information found in your readings. In other words, we will not be lecturing on all the readings and explaining everything in the readings.

Rather, we will expect you to have done the readings and these will serve as a starting point of fascinating joint discussions in class on delving into much more interesting and profound topics. If you do not do the readings before class, you will likely have difficulty in the class. Remember, the exams are open book. In addition you will not likely do well on the daily quiz. 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.*

Primary literature: 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.

As with textbook readings, by taking this class you agree to do the primary literature readings ahead of time. Again, we will not cover basic information from the readings but will use these as jumping off points for deeper and very interesting discussions. 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 urge you emphatically to 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.

WHY DO WE REQUIRE READINGS BEFORE HAND AND WHY WILL WE NOT SIMPLY BE LECTURING FROM THE READINGS AS IN MANY OTHER CLASSES?

We are all here to learn, we all want to learn, and we all need to learn. Learning requires effort. If we lecture strictly on the readings, we will be doing the effort and the learning and will rob you of that valuable experience and opportunity. Also, focusing on higher level learning results in brain development (research shows this!). It's like going to the gym—if you want muscles, you need to exercise. Your brain is the same way. We can't do the exercising for you if the goal is for YOU to have the muscles to allow YOU to succeed in life.

2. Quizzes. Each class will begin with a 3-4 question multiple choice quiz. The goal of this quiz is not to trick you but to give you added incentive to do the reading ahead of time. The class quiz will be strictly on basic understanding of the readings and our expectation is that >85% of the class will get the answers right provided they have done the readings. Another important goal of this quiz is to provide you the students and the instructors feedback on the level of understanding from the readings. These questions will be ringed in an "orange". See below for grading.

3. Interactive classroom sessions with clickers. These form the "meat" of the class. We will pick a few topics from the readings and write multiple-choice questions that involve fascinating topics and deeper

thinking/cognitive analyses. Students will get to click in and vote on their best answer. Then, students will work in assigned groups to discuss the question for a few minutes, followed by re-clicking in with each group selecting one best answer. From here, we will have in-class discussions as to what the right answer is and why. The goal of these sessions is to allow students to become actively engaged in the learning process. i.e., empowering YOU to take charge of your learning! Our goal is to help you develop your mind and thinking capabilities so that you can succeed in a rewarding life. These questions will be ringed in "green". See grading below.

Required for these discussions are seat assignments. Every student will be assigned a seat and a group of 2 other students with which they will interact for the entire quarter. Seat assignments will be available on Sunday night, September 30.

Note for clicker assignments: Our goal with the clickers is not to force attendance. Rather, our goal is to promote participating in class and coming in prepared with the readings. These experiences are the way learning happens, which is our goal.

4. Sections. Sections are important for this class and play a significant role in reinforcing and strengthening your analytical skills. Sections are where your Section Papers are discussed and graded. You must be present to receive a grade on your Section Papers, which can help your grade. Sections that do not cover Section Papers are used to answer questions from the readings and lecture that require further clarification. Section papers are excellent practice for your exams, for your Major paper, and for classroom discussions. Take advantage of these! They are "free" and can only help your grade!

To enroll in section, go to http://sections.ucsd.edu/. There is a limit of 32 students per section. Enrollment starts Monday October 1 at 8 am and continues until Thursday October 4 at 5 pm.
Sections are:

A01	M	4:00p - 4:50p	HSS	2321
A02	M	5:00p - 5:50p	HSS	2321
A03	M	6:00p - 6:50p	HSS	2321
A04	M	7:00p - 7:50p	HSS	2321
A05	W	4:00p - 4:50p	CSB	4
A06	W	5:00p - 5:50p	CSB	4
A07	W	6:00p - 6:50p	CSB	4
A08	W	7:00p - 7:50p	CSB	4

How the class will be evaluated:
1. Exams. There are two exams in this class. A midterm that is half taken in class and half taken home, and an in-class final exam on Tuesday, December 11, 11:30am - 2:30 pm. All exams 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. All exams will be in the same format. Half the midterm will be taken in class and graded. It will be worth **10%** of your grade. The other half will be a take home midterm that will also be graded. This take home midterm will give a more practice at problem solving and for the final exam. It will give you an idea of the grade you are receiving in the class.

The final exam is worth **40%-50% of your grade depending on how you take advantage of homework**. The advantage of having this system is that the midterm is lower stakes and 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 15 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. Major 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 14. *You are to work on these individually*, not in groups, and are expected to do your own thinking and writing. They are due in class on Dec 5 (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, 10% of your grade:
Quizzes (orange box questions): 5% of your grade. You need to get 70% of these questions correct to get full credit. 50% of these questions correct to get half credit.

Green box questions: 5% of your grade. It does not matter whether you get these right or wrong. Participating in 70% of these questions gives you full credit. No partial credit.

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. They may involve figures from new papers not covered in class or figures picked out of papers covered in lecture. You can work on reading and discussing these assignments in groups 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 4% of your grade is assigned an A. For each "I" you score, you will receive ½ a point. Two such scores will add up to 1 point (1½ points at the end counts as 1 point; ½ point at the end counts as 0). If you receive less than full credit for your Section Papers (e.g., 0% or 4%), that remainder of the 10% will transfer to your final. In general, to get and "S" you must receive a 70% or greater on your Section Papers.

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 BIMM124 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, which involves mostly reading (and preferably discussion with in study groups) the textbook and papers before class. Students who do the work and come prepared to class do better!
2. participate in lectures and sections. We have run the statistics. Students that are present in class and section statistically do significantly better than those that are not.
3. ask questions whenever something in not clear, either before/during/after class, during our office hours (please come!), during TA office hours, in sections.
4. do all the assignments—do the Section Papers. Whether you get "S" or not, you will learn a lot in the process.
5. 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 2012; all readings and assignments subject to change; Murray Medical Microbiology = MMM

Date/Lecture topic/Instructor	**Readings**	**Section topic for week**	**Assignment-- available on website by 9 pm Thursday**
September 28 (F); logistics, class intro; RVA & CGB	N/A	Sign up for section	None

Oct 1 (M); Introduction to Bacteria; CGB Oct 3 (W); Damage Response; CGB Oct 5 (F); Immunity I; CGB	MMM: Chapter 2, pp 9 – 20 (through cell division) Pirofski and Casadeval paper MMM: Chapter 9	Class review	Section Paper 1 assigned; due in Sections next week
Oct 8 (M); Immunity II; CGB Oct 10 (W); Immunity III: RVA Oct 12 (F); Immunity IV; RVA	MMM: Chapter 10 MMM: Chapter 11 MMM: Chapter 12, pp 123-131; 139-142 (Immunopathogenesis)	Review/grade Section Paper 1	None
Oct 15 (M); Endogenous flora; RVA Oct 17 (W); Enteric Bacteria (clinical); RVA Oct 19 (F); Enteric Bacteria 1° literature: RVA	Paper TBD MMM: Chapter 30, pp 301-309 Paper TBD	Class review	Section Paper 2 assigned; due in Sections next week
Oct 22 (M); Staphylococcus and Streptococcus (Dr. Victor Nizet) Oct 24 (W); Neisseria Clinical: (Dr. Brian Ellis) Oct 26 (F); Neisseria 1° literature; RVA	MMM: Chapter 21 MMM: Chapter 29, pp 291-299 Paper TBD	Review/grade Section Paper 2	none
Oct 29 (M) TB Clinical; RVA Oct 31 (W); TB 1° literature; RVA Nov 2 (F) in-class midterm	MMM: Chapter 28 but not pp 282-286 (up to Rapidly Growing Mycobacteria) Paper TBD	Class review	Take-home ½ midterm; due in class November 5
Nov 5 (M); Helminths clinical; RVA Nov 7 (W) Bad worms; RVA Nov 9 (F) Good worms; RVA	MMM: Chapter 83, pp. 853-862 top. Paper TBD Paper TBD	Review midterms	Section paper: Experimental hookworm vaccine
Nov 12 (M) No class Nov 14 (W) Introduction to viruses; CGB Nov 16 (F) HIV Clinical; CGB	---- MMM: Chapter 4, pp. 39-54 MMM: Chapter 64, pp. 627-640	Class review	Major paper announced November 14. Section Paper 3 assigned.
Nov 19 (M) HIV 1° literature; CGB Nov 21 (W) Influenza clinical; CGB Nov 23 (F) No class	Paper TBD MMM: Chapter 59 ---	Review/grade Section Paper 3	None
Nov 26 (M) Influenza 1° literature; CGB Nov 28 (W) Alpha & Flavivirus Clinical; CGB Nov 30 (F) Guest lecture	Paper TBD MMM: Chapter 62, pp. 609-617 TBD	No sections; Thanksgiving break	None

Dec 3 (M) Alpha & Flavivirus 1° literature; CGB Dec 5 (W) Fungi; CGB Dec 7 (F) Malaria?; guest lecture	Paper TBD MMM: Chapter 5 TBD	Class review	Final Paper due in class December 5.