SYLLABUS
Class: Medical Microbiology, BIMM124, Winter 2009
Where: HSS 1330
When: 8:00 am – 8:50 am, Monday, Wednesday, Friday
Instructor: Prof. Raffi Aroian (1/12/09 – 2/13/09)

Subject matter covered in this half: immune system, viruses, and eukaryotic pathogens
Office: Bonner Hall, Room 4430
Office hours weeks of Jan. 12, 19, 26, Feb. 2, 9, and 16:
   Tuesday, Friday 9:00 am – 10:00 am
Email: rabimm124@gmail.com (recommended and checked daily in the afternoon. If you email me at this address, you will get the fastest response, almost always in less than 24 hrs. If you email my ucsd address, your email is likely to get lost and my response is likely to be slower since I get so many emails at that address and it is harder to keep track of emails there.). If you want to ask a detailed scientific questions about material in the course, please see me in person during office hours or after class.
Office phone: x2-1396 (858-822-1396)

Required texts: Sherris Medical Microbiology by Kenneth Ryan and George Ray
   Medical Microbiology, 5th Edition, Murray, Rosenthal, and Pfaller. An excellent overall textbook on Medical Micro that will be used for virology sections. Since we can only ask of you to buy one textbook, we did not order it at the bookstore and two copies are on reserve at the BMI for your use there. (Note: although the 6th Edition just came out in December 2008, because the library does not yet have it, we will stick with the 5th Edition.) You can buy copies used for ~$50 at www.abe.com.

Introduction
Medical microbiology is the branch of microbiology that deals with the study of microorganisms including bacteria, viruses, fungi, and parasites that are of medical importance and that are capable of causing diseases in human beings (source http://en.wikipedia.org/wiki/Medical_microbiology). On a daily basis, the quality and span of our lives is greatly influenced by our interaction with microorganisms such as bacteria, viruses, fungi, and parasites. In many cases, these interactions are beneficial. For example, capillaries in the intestines of animals do not develop fully unless there are bacteria present, and intestinal bacteria synthesize vitamins K and B complex, providing these essential compounds to us. Viruses have played a central role in the evolution of life on earth (e.g., a key step in the formation of the human placenta appears to have occurred via the capture of a retroviral gene into the human genome). Fungi play an essential role in recycling nutrients in the environment.

Nonetheless, our interactions with these microorganisms can become dangerous or even lethal. In this class, our goal is to provide you with fundamental and working knowledge of how humans interact with viruses, bacteria, and other microorganisms that cause disease, how scientists study these diseases, and how scientists are working to bring healing to the world by curing these diseases. By definition, a virology class, immunology class, or bacterial pathogen class will give a more detailed view in each of these. Conversely, this class provides a unique opportunity to survey more completely our daily interactions and scientific knowledge of a wide variety of pathogens.

The aims of this half of the class
1. Provide you with a fundamental background in (1) protective responses of the human body to pathogenic attack, e.g., the immune system, (2) life cycle of viruses and how that life cycle can lead to disease, and (3) important eukaryotic pathogens including fungi and protozoa.

2. Study the molecular biology, epidemiology, pathogenesis, and clinical aspects of key disease-causing viruses as well as their interactions with the immune system.

3. Have in class debates of three cutting-edge topics related to medical microbiology. I currently envision these topics for discussions (subject to change): 1. The Hygiene hypothesis: can you be too clean and should we be using pathogens to cure disease? 2. You are a pediatrician; would you give your patients an MMR vaccine? 3. The fight against AIDS: controversies and what grade would you give our efforts to counter this terrible disease? These subjects will be defined, reading material handed out, and each student in the class will have to take up and defend a position.

4. Show you how the scientific method is applied in the study of medical microbiology. The idea is to teach you how scientists and clinicians in the Medical Microbiology field think and solve problems. Learning and memorizing facts is important but in my opinion will rarely lead to job satisfaction or security. Rather, tapping into that tremendous thing we call human curiosity and learning how to identify and solve problems I believe do lead to satisfaction and job security (in this world there is always a demand for people that can identify, think about, and solve problems). We will examine methodology used to study the immune system and diseases in classroom discussions I dub “How do we know?”. We will also learn how scientists make use of their knowledge of these parasites and the immune system to treat and cure microbial and parasitic diseases. This will be discussed in classroom discussions I dub “Power to heal.” These will involve required readings from the primary literature beyond the class textbooks that will be posted on the class website.

5. Strengthen your problem-solving skills via small group problem solving sessions centered on clicker questions and participation in aims 3 and 4.

To achieve these aims, this half of the class will engage you in:

1. Readings from a hardcover and a web-based textbook that cover important aspects of the immune system, viruses and viral diseases, and eukaryotic pathogens. These readings are generally very informative, flow well, cover fascinating material, and will provide you with essential background information for our classroom discussions. I will assume that when you come to class you have already read the readings for that lecture and are familiar with the material. More on this important topic below.

2. The use of clickers and clicker questions. I will start each lecture with a clicker question or two about the readings to help you self-assess how well you are doing with the readings as well as help me determine which areas of the readings might need more clarifying. Although your response to these clicker questions that cover the readings will not count towards your final grade, a strong showing on these questions will be taken into account in the event that you end up with a grade that is borderline. In addition, clickers will be anonymously used periodically during the lecture to help solidify concepts covered in class, give me feedback as to how learning is progressing, have fun with the material, and stimulate classroom thought and discussion.

3. Q&A format in which you will be able to ask me any questions you have about the readings for that lecture, sometimes followed by covering key aspects of the readings.

4. In-class discussions, based on additional readings from primary scientific or review literature supplied on the class website. The subject of these discussions are the three cutting-edge topics mentioned above, as well as “How do we know” and “Power to heal” sessions.
5. Three in class debates dealing with current "hot" topics in Medical Microbiology discussed above. For example, during the past decade, many parents in the UK opted to not have their children vaccinated with the measles, mumps, rubella (MMR) vaccine for fear the vaccine causes autism in their children. As a result, in 2008, for the first time in 14 years, measles was declared endemic in the UK and outbreaks also occurred in Europe. If you were a pediatrician, how would you deal with this? Would you recommend vaccination for your patients? If not, why not? Are you willing to risk the consequences? If you would recommend it, what proof do you have it is safe? How would you convince your patients this is the right thing to do? The bottom line is—how do you being to make the assessment as to what to recommend when someone’s life is on the line?

**Materials for the class**
Required: *Sherris Medical Microbiology* by Kenneth Ryan and George Ray
The Microbial World, by Timothy Paustian, [http://www.microbiologytext.com/](http://www.microbiologytext.com/). Chapter 1 (general introduction; recommended but not required reading) and Chapter 15 (immunology) are free. We will be using Chapter 15 in the class. A copy of the book will be placed on reserve at the biomed library, although this will not have the dynamic animations that are really helpful and well done.
On reserve (2 copies): *Medical Microbiology, 5th edition* by Murray, Rosenthal, and Pfaller (not the just published 6th edition since the library does not have it). An excellent book for viruses. Required reading. We did not order copies for you to buy so as to not make the cost of the course onerous. However, you can, if you want, buy used copies on-line.

iClickers. These can be purchased from the bookstore and will be used for reading self-assessments (see above), dynamic surveys of the material, in-class problem solving sessions, and fun. These can be purchased at the bookstore for $36 new ($27 used) and can be resold back for $18 (so the final cost is little; well worth it!). Clickers will not be used for attendance. If you want potential credit for your clicker responses to reading self-assessment questions, you will need to register your clicker at [www.iclicker.com](http://www.iclicker.com). Whether you register or not, your responses to all other questions/surveys will remain anonymous. It goes without saying, use only your own clicker (see section on Academic Integrity).

**Student and Instructor Evaluations**
Exams. There will be one midterm exam (Feb. 9 in class) and one final exam (cumulative) given on finals week. Dr. Brown has already discussed these. The subject of these exams are based on lectures, readings, and in-class discussions.

Instructor evaluations. Periodically, students will be asked to fill out 1-2 minute evaluations on index cards at the end of class to help evaluate the effectiveness of instruction and the instructor.

**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. I will not tolerate it. Out of respect and appreciation for your own efforts, you should not tolerate cheating among your colleagues either, and I encourage you to talk with any of the BIMM124 staff if you learn of any incidents of academic dishonesty. If I suspect dishonesty, I will meet with you to discuss my concerns, and I will report the incident to the Biology Undergraduate Affairs office and to 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.

**How to succeed in this class**

1. **Attend all the lectures.** The subject matter is absolutely fascinating and vital (our daily life depends on it). There will be videos and supplemental information provided in lecture aimed at increasing comprehension of the material. In addition, there will be (hopefully) stimulating, interactive, and informative discussions of immunology and diseases that you can only participate in if you show up to lecture. Lectures are a great place to ask questions and get clarification of material you don’t understand. And, of course, lectures provide the basis for all the exams. In my recent experience in teaching cell biology (which was podcast), I found that the average cumulative final score of students that consistently showed up to lecture was **13 points higher** (81.3 out of 100 or a B) than students that did not (average final score 68.2, which was a C). The bottom line, show up to lecture.

2. **Do all the readings ahead of lecture.** Discussions in lecture will be based on the assumption that you have already done the readings. I will begin each lecture with the opportunity for you to ask for clarification of anything you need from the readings as well cover a few key points from the readings. Otherwise, our discussions in class will often **build** upon the readings and will assume that you understand the readings without further explanation. That is, I will not explain everything from the readings that I expect you to understand. This is an essential part of the educational process—in life you will rarely if ever run into the circumstance where someone in your job or life will hand you something to read and then come in the next day to explain it all to you. Rather, you will be responsible for figuring out information you need for you job from materials provided, from asking questions, or from searching on your own for the answers. If the reading workload at any time becomes too great, please let me know.

3. **Use key resources at your disposal.** These include your classmates and the web. Do your readings in groups, if possible. Reading in groups will help each of you ask questions of each other and explain the material to each other. Recent research about university education indicate that college students can learn the most about any subject matter from their own peers! Also, use the web. The web is a tremendous resource for defining words you do not know and getting help when you are stuck. If come across the word “rubeola” and don’t know what it means, look it up on the web.

4. **Ask questions.** I will begin each class asking for your questions. If you don’t understand something, ask! Chances are, other people in the class are having the same question you are.

5. **Show up to office hours.** These are times reserved for you to ask questions about materials covered in class or covered in the readings that were not covered in class that you did not fully understand. It is time I have put aside for you. Take advantage of it!

6. **Talk with me, Dr. Brown, or your TAs about any difficulties you are having in the class as soon as you have identified them.** Pro-actively addressing difficulties early on can make a tremendous difference in success.
Schedule of readings (subject to change with 48 hr advance notice). Additional readings usually from primary literature will be posted on website at least 48 hr in advance.

Jan. 12 Innate immunity; Paustian 15-1 to 15-15; Sherris 132-133; Knowledge to heal—the case of frog-derived antimicrobials and their potential in human therapy

Jan. 14 Innate immunity cont’d, adaptive immunity; Paustian 15-15 to 15-24; Sherris 115-132; Knowledge to heal cont’d

Jan. 16 Adaptive immunity; adverse consequences of the immune system; Paustian 15-25 to end; Sherris 134-140.

Jan. 19 Off

Jan. 21 In-class debate I: The hygiene hypothesis controversy: can you be too clean and should we be infecting people with pathogens to cure disease?

Jan. 23 Catch up or Virus structure/classification; Murray 47-53; Sherris 79-86

Jan. 26 Viral replication; Murray 53-62; Sherris 87-104

Jan. 28 Viral pathogenesis; Murray 491-502

Jan. 30 Measles, Mumps, Rubella: Murray 597-606; 645-649; Sherris 513-522

Feb. 2 In-class debate II: You are a doctor. Would you recommend vaccination with MMR?

Feb. 4 Influenza; Murray 609-617; Sherris 495-503

Feb. 6 HIV Murray 657-671; Sherris 601-616

Feb. 9 Midterm

Feb. 11 Fungal infections; Sherris 631-684

Feb. 13 Cutting-edge in-class discussion: The fight against AIDS: controversies and what grade would you give our efforts to counter this terrible disease?