BIOL 506-001 Selected Topics in Microbiology (3 Credits): Cellular Microbiology

Prerequisites: BIOL 305, 306, or permission of instructor. Topic depends on instructor's specialty.

Instructor: Dr. Ramin M. Hakami

Day/Time: Tuesday, 4:30 – 7:10 pm, Spring Term, 2012

Room: Prince William Campus; Occoquan Bldg, Room 302

Office Hours: Wednesdays, 1:00 – 3:00 pm, 10650 Pyramid Place (Biological Research Laboratories), Room 1022, or by appointment.

Email: (Strongly preferred) rhakami@gmu.edu; Phone: 703-993-7084

Required Textbook: Cellular Microbiology, 2nd Edition. Editors: Pascale Cossart; Patrice Boquet; Staffan Normark; Rino Rappuoli. (PW campus bookstore)


Journal Article Assignment (15%): Please see the table on the next page for a list of the topics for these articles and the due dates for presenting them. Each student will be assigned one journal article for the semester and I’ll make the assignments as we go through the semester. For this assignment, select a recent journal article and discuss in class by making a half an hour presentation of the data figures and the findings. You must also provide a critical analysis of the data, not just repeat what is outlined in the article. In other words, you must discuss your analysis of the strengths and weaknesses of the article; for example, whether the methodologies used are appropriate and adequate, if additional experiments are warranted, whether the conclusions of the article are appropriate and match the findings, and what future questions should be addressed. You must e-mail me your selected article by the end of Friday of the week before the presentation week. I’ll then post it on Blackboard so that everyone can access it and have a chance to read it before class.

Late Journal Article Presentation: All journal article assignments must be presented on the indicated due dates. If you miss your assigned presentation date, you will be given a make-up date provided you have written documentation that shows a valid excuse for your absence (e.g., a doctor’s note; police report of a car accident, etc.). Otherwise, you will not receive any credit for this part.

Midterm and Final Exams: These will be closed-book exams given in this class. If you miss the midterm exam, a make-up option will be available provided you have written documentation that shows a valid excuse for your absence (e.g., a doctor’s note; police report of a car accident, etc.). A make-up option is not available for the final exam, and anyone who misses the final exam will not pass the course.

Late Arrival to Class and Laptop Use Policy: Please attend the lectures regularly and try to be on time for the class. If you keep missing the class or habitually arrive late, it will hurt the attendance part of your grade. During class, the use of laptops, or any other type of electronic devices that allow Internet connection or text messaging such as cell phones, iPhones, etc. is prohibited.
<table>
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<tr>
<th>Date</th>
<th>Week</th>
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| Jan 24   | 1    | An Introduction to Cellular Microbiology | Chapter 1: Microbial Pathogens: an Overview,  
|          |      |                                      | Chapter 2: Bacterial Human Pathogen Genomes: an Overview |
| Jan 31   | 2    | Cell biology and ECM                 | Chapter 3: Cell Biology: an Overview.  
|          |      |                                      | Chapter 4: Extracellular Matrix and Host Cell Surfaces: Potential Sites of Pathogen Interaction |
| Feb 7    | 3    | Bacterial Adherence & Cell Adhesion  | Chapter 5: Bacterial Adherence to Cell Surfaces and Extracellular Matrix.  
|          |      |                                      | Chapter 6: Molecular Basis for Cell Adhesion and Adhesion-Mediated Signaling  
|          |      |                                      | **Journal Article 1 topic**: “Your favorite bacteria: Bacterial Adherence to Cell Surfaces”, due Feb 14th.  
|          |      |                                      | **Journal Article 2 topic**: “Your favorite bacteria: Bacterial Adherence to Extracellular Matrix”, due Feb 14th. |
| Feb 14   | 4    | Signaling to Host Cells through Adhesion | Chapter 7: Bacterial Signaling to Host Cells thru Adhesion Molecules & Lipid Rafts  
|          |      |                                      | Chapter 8: Host Cell Membrane Structure and Dynamics.  
|          |      |                                      | **Journal Article 3 topic**: “Your favorite gram-negative bacteria: Bacterial Signaling to Host Cells through Adhesion Molecules”, due Feb 21st.  
|          |      |                                      | **Journal Article 4 topic**: “Your favorite virus: Virus Signaling to Host Cells through Adhesion Molecules”, due Feb 21st. |
| Feb 21   | 5    | Membrane Trafficking and Intracellular Parasites | Chapter 9: Membrane Traffic in the Endocytic Pathway of Eukaryotic Cells  
|          |      |                                      | **Journal Article 5 topic**: “Trafficking of *Yersinia pestis* through Host Cells”, due Feb 28th.  
|          |      |                                      | **Journal Article 6 topic**: “Your favorite virus: Trafficking through Host Cells”, due Feb 28th. |
| Feb 28   | 6    | Host Cell Cytoskeleton               | Chapter 11: The Actin Cytoskeleton: Regulation of Actin Filament Assembly and Disassembly,  
|          |      |                                      | Chapter 12: Bacterial Manipulation of the Host Cell Cytoskeleton.  
|          |      |                                      | **Journal Article 8 topic**: “Your favorite virus: Viral Manipulation of the Host Cell Cytoskeleton”, due March 20th. |
| March 6  | 7    | Secretion Systems. Type III and IV Secretion Systems and MIDTERM EXAM | Chapter 15: Type III secretion Systems in Animal- and Plant-Interacting Bacteria.  
|          |      |                                      | Chapter 16: Bacterial Type IV secretion systems: DNA Conjugation machines Adapted for Export of Virulence Factors.  
|          |      |                                      | **Journal Article 9 topic**: “Your favorite Type III bacteria: Secretion systems and pathogenesis”, due March 27th.  
|          |      |                                      | **Journal Article 10 topic**: “Your favorite Type IV bacteria: Secretion systems and pathogenesis”, due March 27th. |
| March 12 | 8    | SPRING BREAK                         | SPRING BREAK                  |
| March 20 | 9    | Apoptosis                            | Chapter 17: Induction of Apoptosis by Microbial Pathogens.  
|          |      |                                      | **Journal Article 11 topic**: “Induction of host cell apoptosis by *B. anthracis*”, due April 3rd.  
|          |      |                                      | **Journal Article 13 topic**: “Adaptive immune response to *Y. pestis*”, due April 10th.  
|          |      |                                      | **Journal Article 14 topic**: “Immune response to Rift Valley fever virus”, due April 10th. |
| April 3 | 11 | **Virulence Gene Discovery** | Chapter 20. New Tools for Virulence Gene Discovery  
**Journal Article 15 topic:** “Your favorite bacteria: Identifying candidate virulence genes”, due April 24th.  
**Journal Article 16 topic:** “*Y. pestis* gene expression in host cells”, due April 24th. |
| --- | --- | --- | --- |
| April 10 | 12 | **Mechanisms of Virus Infection**  
**Guest Lecture** | Chapter 22. Cell Biology of Virus Infection  
**Journal Article 17 topic:** “Your favorite virus: Regulation of Cellular Protein Synthesis and Expression”, due May 1st.  
**Journal Article 18 topic:** “Your favorite negative strand virus: Signaling through Receptors”, due May 1st. |
| April 17 | 13 | **NO CLASS** | **SCIENTIFIC CONFERENCE** |
| April 24 | 14 | **Genomic and Molecular Tools** | Chapter 21. Genome-Wide Approaches to Studying Prokaryotic Biology  
**Journal Article 19 topic:** “Your favorite bacteria: Use of microarrays in studies of pathogenesis”, due May 1st.  
**Journal Article 20 topic:** “Your favorite bacteria: Use of protein arrays in studies of pathogenesis”, due May 1st. |
| May 1 | 15 | **Last Day of Class** | **Wrap-up:** presentation of remaining journal articles |
| May 15 | | **FINAL EXAM** | Closed Book Final |

**Academic Integrity**
GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. Academic integrity in this course means that you will perform the assigned tasks and if you rely on someone else’s work an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

**GMU E-mail Accounts**
Students must use their Mason email accounts—either the existing “MEMO” system or a new “MASONLIVE” account to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information.

**Office of Disability Services**
If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. http://ods.gmu.edu

**Other Useful Campus Resources**
UNIVERSITY LIBRARIES “Ask a Librarian” http://library.gmu.edu/mudge/IM/IMRef.html  
COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): (703) 993-2380; http://caps.gmu.edu

**University Policies**
The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.