Welcome to BIOL 669: Pathogenic Microbiology (3 credits)

Fall 2020 (Thursdays, 4:30 pm - 7:10 pm)
Katherine G. Johnson Hall (formerly Bull Run Hall), Room 253

IMPORTANT NOTE: First year MS students are strongly encouraged to take this course during the second year of their studies, after they have had a chance to take either BIOL 682 or BIOL 744 and pass with grade of B or higher. The recommended prerequisites for this course are "BIOL 682 or BIOL 744 with grade of B or higher".

This graduate level course will address the molecular mechanisms by which bacterial and viral pathogens cause human disease. Basic principles of pathogenesis will be first presented before conducting a survey of several infections that represent medically important and relevant diseases. The molecular interactions between hosts and their infecting microbes will be thoroughly discussed, including specific virulence factors and mechanisms, specific aspects of immune response to infection, and experimental approaches to examine host-pathogen interactions and identify genetic factors affecting virulence.

Main Course Objectives:

1. Develop a solid understanding of the complex nature of virulence with respect to the multi-faceted interactions with the host and the host immune response mechanisms.
2. Learn the strategies used by pathogens to cause manifestation of human disease (e.g., attachment and entry into host cells, evasion of host immune defenses and establishment of persistence)
3. Learn some of the strategies for treatment and prevention of human infection (e.g., vaccines, antibiotics)
4. Relate objectives 1-3 above to contemporary research literature in the field of microbial pathogenesis

Professor:	Ramin M. Hakami, Ph.D., Discovery Hall (PW Campus), Room 161 E-mail: rhakami@gmu.edu; Phone: 703-993-7084. Contact by e-mail is preferred.
Office Hours:	Every Friday from 3:00 – 5:00 pm; please be sure to e-mail at least a day ahead. If needed, it will be conducted by WebEx to ensure social distancing measures.
Course Website:	Login at http://mymason.gmu.edu to access Blackboard for course-related materials. Please contact support center if you need help with Blackboard (Phone: x3-8870, E-mail:

There are a total of 2 required exams for this course: a midterm exam, and a final exam. Other graded materials will include oral presentation of a journal article, and attendance. There are absolutely no make-up exams during the semester for **any** reason. If you miss the midterm exam and have an appropriate **official verifiable document** for the excuse, then more equal weight will be given to your journal article presentation and your final exam (i.e., your final exam will account for 45% of your grade and your class presentation will count for 40% of your total grade). Absence from the final exam due to illness will be excused for which you must provide an **official verifiable document**. However, other causes for missing the final exam must be approved by the student's academic Dean or director. If absence from the final exam is unexcused, the grade for the course is entered as F. If you miss the final exam with a valid excuse, then more equal weight will be given to your journal article presentation and your midterm exam.

Grade Distribution and Policy:

Midterm exam	30%
Final exam	30%
Class presentation	25%
Discussion participation	10%
Attendance	5%

Exam grades will be curved based on class average

Final Grades:	
87-100	A
84-86	A-
81-83	B+
78-80	B
75-77	B-

SCHEDULE OF WEEKLY LECTURE TOPICS:

Date	Week	Topic	Class Presentations
August 27	**1**	Germ Theory, Disease Terminology, and General Characteristics of Pathogens	
September 3	**2**	Molecular Approaches to Study Pathogenicity	
September 10	**3**	Microbial Attachment to Host Cell and Entry	
September 17	**4**	Innate Host Immune Response	
September 24	**5**	Adaptive Host Immune Response	
October 1	**6**	Microbial Evasion of Host Immunity	
October 8	**7**	COVID-19 (Open Class Discussion)	
October 15	**8**	**MIDTERM EXAM (closed book)**	
October 22	**9**	Pathogenic Host Cell Death Mechanisms	1 & 2
October 29	**10**	*Yersinia pestis* and other Yersinia spps	3 & 4
November 5	**11**	*Staphylococcus aureus* Infections	5 & 6
November 12	**12**	*Mycobacterium tuberculosis*	7 & 8
November 19	**13**	*Bacillus anthracis* and other Bacillus spps	9
November 26	**14**	Thanksgiving Holiday	
December 3	**15**	Vaccines and Antimicrobials	
December 10	**16**	**FINAL EXAM (closed book)**	

GRADED MATERIALS:

1. **Exams (60% of grade)**

   The exam question format will be a combination of multiple-choice and short answer/description questions. There are no make-up exams under any circumstances; however, if you have a valid excuse to miss the midterm exam (must provide appropriate official and verifiable documentation), the percentage of total grade assigned to that exam will be instead distributed equally toward your journal article presentation and final exam (i.e., your final exam will account for 45% of your grade and your class presentation will count for 40% of your total grade). Absence from the final exam due to illness will be excused for which you must provide an appropriate official verifiable document. However, other causes for missing the final exam must be approved by the student's academic dean or director. If absence from the final exam is unexcused, the grade for the course is entered as F. Only the lecture materials (not the class presentations) will be tested on the exams. The midterm exam will cover lecture materials from week 1 through week 6. The final exam will cover lecture materials from week 9 through week 15. Please note that week 7 is an open class discussion on COVID-19 and will not be included on any exam. However, participation in the discussion for this week 7 class influences your final grade as described below in the "Discussion Participation" section**.**

2. **Journal Article Presentations (25% of grade)**

   Students will be assigned into groups of two per team to make a 40-minute presentation of a full-length original research article (i.e., not a short communication or a short research paper) that is directly on a topic assigned by me two weeks before the presentation date. "Review" articles are not accepted for class presentation as they provide a review/summary of majority of the work that other research groups have published in a specific research area but are not themselves original research papers. Both members of each team must do part of the presentation, and each member of the team will be graded on the quality of their own presentation. I will post the topic assignment on Blackboard. All topics are directly related to the course, and have been selected in such a way as to complement the lecture materials.

   I must receive by e-mail your selected article in PDF format no later than Monday morning of the week in which you are presenting. I'll then post it on Blackboard so that everyone can access it and have time to read it before class. If you have any doubts as to whether you have selected the right type of article for your topic, please consult me and I would be more than happy to provide guidance.

   For this assignment, you must select a full-length research article that is published no earlier than 2017 in a journal with an impact factor of >3. Some examples of strong journals that satisfy this requirement are *Cell*, *Nature*, *Nature Immunology*, *Nature Cell Biology*, *Nature Genetics*, *Science*, *PLoS Pathogens*, *Proceedings of the National Academy of Sciences USA* (PNAS), *Scientific Reports*, *Molecular Cell*, *EMBO Journal*, *Infection and Immunity*, *Frontiers in Microbiology*, *Journal of Cell Biology*, *PLoS Genetics*, *Journal of Virology, BBA General Subjects, Journal of Biological Chemistry, Nucleic Acid Research, Journal of Bacteriology*, *The Journal of Infectious Diseases, Emerging Infectious Diseases*.

   To ensure receiving maximum points for your presentation, in addition to observing the above requirements the following aspects related to the presentation itself must also be followed:

   A. In addition to presenting and describing the data figures and findings of the research article, you must also provide your own critical analysis of the data. In other words, you must discuss your own analysis of the strengths and weaknesses of the article; for example, whether the methodologies used are appropriate and adequate, if proper and adequate controls have been used for the experiments and if additional experiments are warranted to strengthen a particular claim, whether you think the conclusions of the article are appropriate and match the findings, what future questions should be addressed, etc. You must be specific. Also, you must provide satisfactory reasons for your criticisms; it is not sufficient to state a criticism without explaining the reasons behind it.

B. As part of your presentation, you must also clearly explain the main techniques that have been used in the research article for generating the results. Obviously, this requires taking time to educate yourself about the main techniques in the article if you are not already familiar with them; if you find that you need help with this, please let me know and I would be happy to guide you. While it is not necessary to know or present the minute details of any given technique, you should nevertheless have sufficient understanding of the essentials of how the technique works and what type of information it provides so that you can clearly explain it to the class or if asked by the audience. For most techniques, use of graphics/drawings and/or images to explain the essential concepts to the audience can be very helpful.

Late Journal Article Presentation: All journal article assignments must be presented on the assigned due dates. If you miss your assigned presentation date and have written documentation that shows a valid excuse for your absence (e.g., a doctor's note) either you will be given a make-up date if one is available, or the percentage of the total grade assigned for the class presentation (25%) will be instead distributed equally towards the two exams (i.e., the midterm exam and the final exam each will count towards 42.5% of your grade). You will not receive any credit for this part if you cannot provide a valid documented excuse for your absence.

3. **Discussion Participation (10% of grade)**
   To get credit for this part of the grade, you must engage in the following class discussions: 1) Open class discussion on COVID-19 scheduled for week 7 class; 2) Discussions that follow each journal article presentation, by taking the initiative to ask relevant scientific questions, or provide ideas and analytical thoughts, about the presented findings and conclusions. Credit will be given for thoughtful questions and comments on the experimental procedures, the data presented and the conclusions, not on more "trivial" aspects such as figure resolution/quality, etc. You must have a regular engagement in these discussions (i.e., for all presentations) in order to ensure receiving full credit.

4. **Class Attendance (5% of grade)**
   You must attend the entire length of all the lectures and also exam sessions to receive full credit for this portion of the grade. The percentage of total grade assigned to attendance is distributed equally among all the lecture classes for the semester. If you miss a class and do not have a valid documented excuse, or your "absence from class request" has not been granted in advance, you will not receive credit for the portion of grade for that class. If you have a legitimate reason not to attend, you should notify me in advance and arrange to receive any notes, etc. from a classmate.

SUGGESTED READINGS:

1. **Cellular Microbiology; 2nd Edition.**
   Editors: P. Cossart, P. Boquet, S. Normark, R. Rappuoli
   Publisher: American Society of Microbiology, 2005
2. Bacterial Pathogenesis: A Molecular Approach; 3rd Edition
   Authors: B. A. Wilson, A. A. Salyers, D. D. Whitt, M. E. Winkler
   Publisher: ASM Press, 2010
3. Brock Biology of Microorganisms; 14th Edition
   Authors: M. T. Madigan, J. M. Martinko, K. S. Bender, D. H. Buckley, D. A. Stahl, T. Brock
   Publisher: Pearson, 2014
4. Principles of Bacterial Pathogenesis; 1st edition
   Editor: E. A. Groisman
   Publisher: Academic Press, 2001
5. Bacterial Disease Mechanisms: An Introduction to Cellular Microbiology; 1st Edition
   Authors: M. Wilson, R. McNab, B. Henderson
   Publisher: Cambridge University Press, 2002
6. Reading Primary Literature: A Practical Guide to Evaluating Research Articles in Biology.
   Author: C. M. Gillen.

Publisher: Pearson, 2007
Additional suggestions:
Dixon, B. (1994) Power Unseen: How Microbes Rule the World
Postgate, J.R. 4th Ed (1999) Microbes and Man
Prescott, L.M. et al. (2001) Microbiology
Atlas, R.M. & Bartha, R. 4th Ed (1998) Microbial Ecology: Fundamentals & application

SOME IMPORTANT DATES:

August 31	Last day to add class
September 8	Last day to drop with 100% refund
October 15	Midterm exam
December 10	Final exam

Each student must verify the accuracy of their enrollment before the end of add/drop period. Students not properly enrolled by the deadlines will not be granted any schedule adjustments by the Department or the Dean's Office.

- **DURING CLASS, LAPTOPS ALLOWED ONLY FOR CLASS-RELATED USE**
- **NO PHONE OR OTHER COMMUNICATION DEVICES DURING CLASS**
- **NO TALKING WILL BE ALLOWED DURING AN EXAM.**
- **ALL STUDENTS ARE EXPECTED TO ABIDE BY THE LETTER AND THE SPIRIT OF THE HONOR CODE AT MASON; PLEASE SEE BELOW**

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. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in 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. Class discussions 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 and perspectives. When in doubt (of any kind), please ask for guidance and clarification.

GMU EMAIL ACCOUNTS

Students must use their Mason email accounts 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 also 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

WRITING CENTER: A114 Robinson Hall; (703) 993-1200; http://writingcenter.gmu.edu
UNIVERSITY LIBRARIES "Ask a Librarian" http://library.gmu.edu/ask
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.

QUESTIONS? PLEASE ASK!