Welcome to BIOL 669: Pathogenic Microbiology (3 credits)

Fall 2021 (Thursdays, 4:30 pm - 7:10 pm)
Synchronous Online Class:
https://us02web.zoom.us/j/5847654684?pwd=dU9jOXpjSzVVYUExdmMwdjJ2RkRSUT09
Meeting ID: 584 765 4684; Passcode: q4rUDb

IMPORTANT: Per recommended prerequisite for this course, first year MS students are strongly encouraged to take this course after passing either 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
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. 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. It will be conducted by Zoom to ensure social distancing measures.
Course Website:	Login at http://mymason.gmu.edu to access Blackboard for course-related materials. Please contact support center for Blackboard assistance (Phone: x3-8870, E-mail: courses@gmu.edu)
Course Lectures:	Please go to Dr. Hakami's personal meeting room in Zoom: https://us02web.zoom.us/j/5847654684?pwd=dU9jOXpjSzVVYUExdmMwdjJ2RkRSUT09

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-
72-74	C

SCHEDULE OF WEEKLY LECTURE TOPICS:

Date	Week	Topic	Class Presentations
August 26	**1**	Germ Theory, Disease Terminology, and General Characteristics of Pathogens	
September 2	**2**	Molecular Approaches to Study Pathogenicity	
September 9	**3**	Microbial Attachment to Host Cell and Entry	
September 16	**4**	Innate and Adaptive Host Immune Response	
September 23	**5**	Adaptive Host Immune Response	
September 30	**6**	Microbial Evasion of Host Immunity	
October 7	**7**	COVID-19 (Open Class Discussion)	
October 14	**8**	**MIDTERM EXAM (closed book)**	
October 21	**9**	Pathogenic Host Cell Death Mechanisms	1 & 2
October 28	**10**	*Yersinia pestis* and other Yersinia spp.	3 & 4
November 4	**11**	*Staphylococcus aureus* Infections	5 & 6
November 11	**12**	*Mycobacterium tuberculosis*	7 & 8
November 18	**13**	*Bacillus anthracis* and other Bacillus spps	9 &10
November 25	**14**	Thanksgiving Holiday	
December 2	**15**	Vaccines and Antimicrobials	11 &12
December 9	**16**	**FINAL EXAM (closed book)**	

GRADED MATERIALS:

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

The exam question format will be a combination of multiple-choice questions and questions for which you must provide descriptive answers. The exams will include questions that are specific and require your in-depth understanding of important specific concepts and details or names that will be presented in the lectures, as it is an important means of testing your sufficient mastery of the course materials. I will provide you with sample test questions before the mid-term exam, in order to provide you with a clear idea of the type of questions that will be on the exams.

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 35-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 that includes presentation of some of the data figures, 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, but not on more "trivial" aspects such as figure resolution/quality, etc. You must have a regular engagement in these discussions in order to ensure receiving full credit. Specifically, to receive full participation credit, you need to either ask a question of the type described above, or engage in the discussion surrounding a question that someone else has asked, for at least 70% of the presentations (including COVID-19 discussion) during the semester. This excludes your own assigned presentation.

4. **Class Attendance (5% of grade)**

You must be online and have your video turned on for the entire length of all the lectures to receive full credit for this portion of the grade. The percentage of total grade assigned to online 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.

*****EXTREMELY IMPORTANT***:**

All quizzes and exams will be administered through the Respondus Lockdown browser with both webcam and microphone, which does video recording of your environment in which your are taking the exam and also record sound. You MUST make sure to do all the items listed below with due diligence. It is entirely YOUR responsibility to observe all that has been indicated below with regard to taking the quizzes and exams using the Respondus software, and you must fully accept the consequences if you fail to observe one or more of these items. Everyone in the class is required to send me an e-mail indicating that you have fully understood this section of the syllabus and that you agree to accept FULL REPSONSIBILITY for observing all that has been indicated and also FULLY ACCEPT the consequences if you fail to observe one or more of these items:

1. Before taking a quiz or exam, you must make sure to have the Respondus Lockdown browser installed on your computer with webcam and microphone and test it to make sure it works (NO EXCEPTIONS). If you run into any IT issues, including when you go to take a quiz or exam, you should contact the GMU IT services; the following link provides information on various ways to contact the IT services at GMU for assistance: https://its.gmu.edu/help-support/its-support-center/
2. You must make sure that you have strong and reliable internet connection where you take the exams to ensure that you can complete the test and that your video and sound are recorded for the full length of the exam.
3. Before you begin the test, you are required to pan the camera slowly to clearly show the ENTIRE room in which you are taking the exam, including everything that is on the desk at which you sit to take the exam and everything that is in front of you, plus the entire floor and ceiling of the room as well. It is fine to have a white piece of paper and pen with you in case you need to write things down as you are taking the test, but you must show to the camera both the front and back side of the sheet to show that it is an empty sheet. There should not be anyone with you in the room during the exam and you are not allowed to leave the room at any time during the test.
4. NO FORM OF COMMUNICATION BY PHONE OR ANY OTHER DEVICES IS ALLOWED DURING AN EXAM.
5. You must make sure that your entire face is seen by the camera throughout the exam. You also need to pay attention to where you are looking (your eye movements) when you are taking the test. If you often look away from the computer screen for the test with a fixed look or stare at something else that could be indicative of reading something other than the test, the software flags your video and it can raise suspicions.
6. All students must abide by the letter and the spirit of the Honor Code at Mason. Please be sure to diligently do all the steps indicated above and strictly follow the Honor Code at GMU as described below. If a suspicion of Honor Code violation is raised (such as suspicion of cheating on an exam), the Office for Academic Integrity (OAI) at GMU must be informed according to what has been requested of the faculty. If they find evidence of Honor Code violation, the OAI could choose to impose severe sanctions that could have major implications. As I am always very much invested in the success of every student and deeply wish that all the students in the class do as well as possible, it would sadden me greatly to have to refer any case to the OAI. To avoid this and prevent a difficult situation for yourself, please be sure to be alert and strictly follow the Honor Code:

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. When you take any test (quiz or exam), you will not cheat. 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.

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 30	Last day to add class
September 7	Last day to drop with 100% tuition refund
October 14	Midterm exam
December 9	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.

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!