Syllabus BIO F240 Beginnings in Microbiology

Instructor:

Dr. James W. Brown
Contact phone: (732) 861-6854
Email: jwbrown9@alaska.edu
Office hours: Via email, cell/text (732) 861-6854 (I am on Eastern Time 4 hours later than AK)
Mon-Fri 6 AM – 5 PM AKST
Sat-Sun 9 AM – 1 PM AKST
(be sure to leave your name and phone number if I do not answer immediately)
Home Address: 107 Lakewood Road, Neptune NJ 07753

Biography:

Dr. James Brown is a pioneer in online course development in science. He has been dubbed the “Godfather of Online Science” and was designated One of the Top 40 Innovators in Education by the Center for Digital Education. He received his M.S. and Ph.D. in microbiology from the Waksman Institute of Microbiology at Rutgers University and an additional M.S. in Health Sciences from New Jersey City University. He is a former director of microbiology for Roche and an Assistant Commissioner of Health for New Jersey overseeing the Division of Public Health and Environmental Laboratories. He is a former Dean of Science, Engineering, Health Sciences and Human Performance for Ocean County College that became an East-Coast powerhouse for online science course development with over 14 unique online science courses. He developed the Online Science Laboratory Series for the Sloan Consortium (now named the Online Learning Consortium) in the Spring of 2014 which helps train science faculty and instructional designers in how to develop online courses in science. Dr. Brown teaches science totally online at several colleges and universities. Dr. Brown presented “Opening Online Laboratory Science Courses to the World Community” at the University of the West of Scotland, held in Paisley Scotland, June 28 – 30, 2017 and “Online Science Laboratory Courses Across the Globe” at the Online Learning Consortium Accelerate in Orlando on November 17, 2017, and on May 1, 2018 “Placing Prerequisite Nursing Lab Science Courses Totally Online” at the United States Distance Learning Association’s 2018 Conference in Indianapolis, Indiana.

Teaching Assistant:
Christopher Kasanke, soon to be Dr. Christopher Kasanke.
Contact Phone (701) 870-4069
Email cpkasanke@alaska.edu
Office hours: Chris will make microscopes available for local students and be available himself to answer questions and discuss course material and help students with LabPaqs: **Tuesdays 6-9 PM in 206 Murie Building, UAF campus.**
Campus Mailing Address: UAF PO BOX 751906
Fairbanks, AK 99775

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**Course Description:**

This course is designed to introduce beginning students to the discipline of microbiology. Topics include disease paradigms, basic taxonomy and life histories of relevant pathogens, mechanisms of immunity, clinical methodologies, general epidemiology, microbial metabolism, and the control of microbial agents. Students will be exposed to these core topics in sufficient detail to build a conceptual framework of microorganisms that can be applied immediately in a future career.

**Course goals:**

- Acquire the language to become conversational in correspondence with medical and scientific professionals.
- Gain an understanding of the relationship between host, pathogen, and environment.
- Acquire/advance professional development skills through writing and presentations.

**General student learning objectives:**

- Understand the role of microbes in biomedicine.
- Explain the disease triangle.
- Explain the acquisition/evolution of antibiotic resistance.
- Explain contemporary (and developing) techniques for the control of microbes.
- Explain the disease cycle.
- Explain the differences between prokaryotes, eukaryotes, and viruses.
- Understand how molecular biology is applied for clinical purposes.

**Instructional Methods:**

- The entire course will be taught totally online through Blackboard.
- Students will complete microbiology laboratories at a location of their choice such as their home, apartment or Tues 6-9 PM in 309 Murie Building, UAF campus. Students will need to obtain a Microbiology LabPaq LP-2230-MB-03 from Hands-On Labs.
including a microscope with an oil immersion lens so they are able to observe bacteria.

- All readings, assignments, quizzes and class discussions will be conducted online. Students must participate at least on a weekly basis.

**Course reading materials:**

- The required textbook Microbiology by OpenStax produced by Rice University is available totally free of charge and completely online at [https://openstax.org/details/books/microbiology](https://openstax.org/details/books/microbiology)

*Microbiology Textbook by OpenStax*

**Lecture Section:**

- **Quizzes**

  Examination format will include multiple choice and true/false questions, which will test your knowledge of the material presented in lecture, readings, and research. The 7 quizzes are designed to drive the student to the textbook. They are not timed and are able to be taken over and over again with only the highest grade being recorded.

- **Participation in the general discussion**
(Main discussion area) on the course website. You must read the posts of all the students in the class and occasionally add your thoughts or share relevant materials which add and enrich the class discussion. This can be done by clicking on the reply button and adding your post to the discussion or by starting your own discussion on something you may have read or found on the Internet, etc. The discussions required for this class will be based upon current developments in the microbiology and medical communities. Each learner is responsible for sharing material they may have recently read in a journal, newspaper, magazine, on the Internet, have heard or seen on radio or TV. You may initiate a topic for discussion or post in response to discussions others have initiated, as well as be ready to respond to other learners' comments and answers. Threaded Discussions are designed to create an intellectual dialog between each learner as well as me, the facilitator. Your interactions and responses must be supported by reasoned and researched facts, opinions are wonderful, but they are just that - opinions. Intellectual dialogue (even in an asynchronous mode) must be civil, collegial, and fact-based. Quality in posting comments and responses is more important than the number of posts per discussion topic. References of where the information was obtained should be cited. The focus of the discussion should be scholarly.

**Forum Discussions Point Distribution:**

- Original Post Content of 300 to 500 words or more (55 points possible)
- Spelling/Grammar/Punctuation (15 points possible)
- References beyond the textbook (10 points possible)
- At least 2 quality Reply Posts of at least 100 words (20 points possible) Total points = 100

**Pathogen Research Paper**

Select a specific pathogen (Genus & species) that you have covered either in your reading to this point in the course or one that will be covered in later sessions. A pathogen is defined as any infectious microbial agent such as a virus, bacterium, prion, or fungus that causes disease or illness to its host. Explore beyond your reading assignments to research current findings relative to the pathogen and their impact on current medical practice.

The pathogen research paper should contain the following on the selected pathogen:

- Introduction or background information (include quantitative information as well as qualitative description whenever possible)
- Basic characteristics (i.e. shape, gram stain, envelope or non-enveloped virus, etc.)
- Modes of transmission
• Virulence factors (molecules expressed and secreted by a pathogen that aid in pathogenesis)
• Prevention and treatment

Write this capstone report in Microsoft Word and format it according to APA guidelines. Properly cite your sources for the points explored in the outline. Use the rubric linked to this assignment for the standard of writing required for this assignment.

Lab Section:

Microbiology LabPaq by Hands-On Labs

There are two alternatives available to you as ways to complete the laboratory requirements for this course:

1) Purchase the LabPaq plus microscope with an oil immersion lens from Hands-On Labs (directions for doing so are below);

2) Or, if you are local in Fairbanks you may choose to purchase only the LabPaq and come to use the microscopes in 206 Murie Building on the UAF campus on Tuesday evenings between 6-9 throughout the fall semester.

Instructions for Ordering Lab Kits

• These course materials may be purchased from Hands-on-Labs via the directions and contact information below.

2. Click on "Order" Click on the Big GREEN Yes Button
3. Enter the login: C000369
4. Enter the password: labpaq
5. Click on the "MICROBIOLOGY" link under the "UNIVERSITY LABPAQS" tab
6. Purchase the lab kit and a 1500x microscope (if you don’t have access to one already)
7. If you already have the microscope please purchase the 100x Oil Immersion Lens to upgrade your microscope.

• Instructions for Accessing HOL Cloud Your student enrollment link:

Your course link using kit LP-2230-MB-02 is:
https://myhol.holscience.com/enroll/mskh-rnwm-hsvh-wfmw
Image of the Online Learning Platform from HOL Cloud

Throughout this course, you will be using the online learning platform, HOL Cloud, to perform your laboratory experiments. HOL Cloud contains interactive course material as well as step-by-step instructions for performing your weekly experiments. An HOL Cloud access code is required to perform all lab experiments. The access code is included with the purchase of a lab kit. Instructions for using HOL Cloud are provided in your lab kit and, also, in your Blackboard course under the link "IMPORTANT" located on the left-hand menu. Please contact Hands-On Lab (866-206-0773) if you encounter any problems.

• The laboratory component of this course has specific requirements, as the laboratory exercises will be performed in your home and in a virtual environment. First, it is important to maintain a clean, safe working environment; therefore, the following safety rules must be observed:

1. Hand washing and other hygienic methods must be employed to ensure that there is no contamination to each other or to the specimens.
2. Microscopes must be cleaned before they are put away.
3. All waste must be disposed of in the appropriate receptacles in your home.
4. The laboratory area in your home must be cleaned and all instruments returned to their appropriate storage containers.

You will complete 9 Laboratory Reports for a total of approximately 1/3 of the grade based upon exercises completed in the laboratory manual. Remember, YOU MUST purchase a lab kit and have access to a microscope, either by purchasing it or coming to the UAF campus for microscope access, to complete this course – failure to do so will be considered cheating and you will either be withdrawn from this course, or in the worst-case scenario, receive a failing grade. In order to pass this course, all labs must be completed with a combined average score of at least a 70. All lab reports will be submitted as a PDF.

• Pictures are required for the lab reports. In addition to the LabPaq kit, microscope, and oil lens, you will need a digital camera or cell phone with picture-taking capabilities. Lab reports will not be accepted without photos documenting completion of the labs. The camera will be used to take pictures of the results of your lab experiments, including photos of what you observe under the microscope. These photos are required as a part of your lab reports. Many cameras will self-focus if the lens of the camera is simply held to the microscope eyepiece. You can just focus the microscope, move your head away and put the lens to the eyepiece and click. It might take a few attempts to get the picture focused. The picture then can be uploaded to the computer as a JPEG or a GIF and sent. You should not simply take the picture and send it. It will be way too large and may be kicked back to you. Saving it as a JPEG or GIF will allow you to resize it before you send it.
### Grading:

#### Lecture

- Discussions (14 discussions 100 points each) 1400 points
- Pathogen Research Report 400 points
- Quizzes (7 quizzes 100 pts. each) 700 points
- Total lecture 2500 points

#### Laboratory

- 9 Laboratory reports Labs 1 – 3 100 points each
- Labs 4 – 9 200 points each
- Total lab 1500 points

- Total Course Points 4000 points

### Grading Scale: (% of total course points)

Final grades for the course will be based on the following scale.

- A (90-100%)
- B (80-89%)
- C (70-79%)
- D (60-69%)
- F (<60%)

### Course policies:

- **Attendance:**

  Attendance is required on a weekly basis for the entire course.

- **Plagiarism:**

  Plagiarism will result in immediate failing of the assignment. Cheating on exams will result in immediate failing of the exam. All cases of plagiarism will be reported to UAF administration for further investigation. Plagiarism includes copying text directly from other sources and stealing ideas. To avoid plagiarism, use quotation marks around identical text and provide a citation. For paraphrased sentences, always provide a citation. For more information, please see [http://library.uaf.edu/ls101-plagiarism](http://library.uaf.edu/ls101-plagiarism).

- **Late work policy:**

  Late assignments will be penalized 10% per day they are late. Documented excuses are appropriate to avoid late penalties.

- **Make-up quizzes:**
Quizzes can be taken over and over again and only the highest grade counts. The purpose of the quizzes are to drive you to the textbook and have you become familiar with the content.

• Extra credit:

There is no extra credit.

Support Services:

I strongly encourage students to seek help in understanding/interpreting data and assignments. Please don’t hesitate to contact me via email at jwbrown9@alaska.edu or text/phone at 732 861-6854. UAF libraries are a great resource for supplementary materials that are available at no cost. Additionally, UAF offers a number of support services, available at http://www.uaf.edu/sss/.

Students with Disabilities:

UAF is committed to equal opportunity for all students. Students with even minor disabilities, students who are the first in their families to attempt a four-year college degree, or students whose incomes are low, have opportunities for a tutorial and other forms of support from the office of Disability Services or the office of Student Support Services. If you need classroom accommodations or other support, please meet with me during office hours as soon as possible to let me know; and please make an appointment with the Office of Disability Services at 474-7043 and Student Support Services at 474-2644, to enlist the appropriate support. I will collaborate to provide the appropriate accommodations and supports or services to assist you in meeting the goals of the course.

Lecture and Lab Schedule for BIOL 240

Week 1 Aug 27 – Sept 2
Introduction to Microbiology and Microbes
Read the following in Microbiology OpenStax
Chapter 1. An Invisible World
Chapter 2. How We See the Invisible World Course
Weekly Discussions:
Initial discussion due Thursday, Replies to other students due Sunday
Laboratory: Order Labs from Hands-On Labs

Week 2 Sept 3 – Sept 9
Cellular Structure, General Classification/Morphology
Read the following in Microbiology OpenStax
Chapter 3. The Cell
Chapter 4. Prokaryotic Diversity
Chapter 5. The Eukaryotes of Microbiology Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Lab 1: Getting Started
Quiz 1 Chapters 1 - 5

Week 3 Sept 10 – Sept 16
Viruses and Virus-like Agents
Read the following in Microbiology OpenStax
Chapter 6. Acellular Pathogens
Course Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Lab 2: Getting Started and Laboratory Safety

Week 4 Sept 17 – Sept 23
Microbial Growth, Nutrition, and Metabolism
Read the following in Microbiology OpenStax
Chapter 7. Microbial Biochemistry
Chapter 8. Microbial Metabolism
Chapter 9. Microbial Growth Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Lab 3: Microbiology Laboratory Preparation
Quiz 2 Chapters 6 - 9

Week 5 Sept 24 – Sept 30
Microbial Genetics
Read the following in Microbiology OpenStax
Chapter 10. Biochemistry of the Genome Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Lab 4: Microscopy for Microbiology – Use and Function

Week 6 Oct 1 – Oct 7
Gene Transfer, Genetic Engineering and Genomics
Read the following in Microbiology OpenStax
Chapter 11. Mechanisms of Microbial Genetics
Chapter 12. Modern Applications of Microbial Genetics Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Lab 5: Aseptic Technique and Culturing Microbes
Quiz 3 Chapters 10 - 12

Week 7 Oct 8 – Oct 14
Controlling Microbial Growth, Chemotherapy and Antimicrobial Discovery
Read the following in Microbiology OpenStax
Chapter 13. Control of Microbial Growth Chapter
14. Antimicrobial Drugs Course Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday

Lab 6: Bacterial Morphology and Staining Techniques

**Week 8 Oct 15 – Oct 21**

Microbial Pathogenicity
Read the following in Microbiology OpenStax
Chapter 15. Microbial Mechanisms of Pathogenicity
Chapter 16. Disease and Epidemiology Course Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Quiz 4 Chapters 13 - 16

**Week 9 Oct 22 – Oct 28**

Immunology
Read the following in Microbiology OpenStax
Chapter 17. Innate Nonspecific Host Defenses
Chapter 18. Adaptive Specific Host Defenses Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday

Lab 7: Bacterial Enumeration - Dilutions and Plate Counts

**Week 10 Oct 29 – Nov 4**

Infectious Diseases
Read the following in Microbiology OpenStax
Chapter 19. Diseases of the Immune System Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday

**Week 11 Nov 5 – Nov 11**

Infectious Diseases
Read the following in Microbiology OpenStax
Chapter 20. Laboratory Analysis of the Immune Response Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday 10

Lab 8: Biochemical Testing for Microbial Identification – Methyl Red, Voges-Proskauer, and Catalase Testing
Quiz 5 Chapters 17 - 20

**Week 12 Nov 12 – Nov 18**

Infectious Diseases
Read the following in Microbiology OpenStax
Chapter 21. Skin and Eye Infections
Chapter 22. Respiratory System Infections Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Week 13 Nov 19 – Nov 25
Infectious Diseases
Read the following in Microbiology OpenStax
Chapter 23. Urogenital System Infections
Chapter 24. Digestive System Infections Course
Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday
Lab 9: Antibiotic Sensitivity-Kirby Bauer Diffusion
Test Quiz 6 Chapters 21 - 24

Week 14 Nov 26 – Dec 2
Infectious Diseases
Read the following in Microbiology OpenStax
Chapter 25. Circulatory and Lymphatic System Infections
Chapter 26. Nervous System Infections
Course Weekly Discussions: Initial discussion due Thursday, Replies to other students due Sunday

Week 15 Dec 3 – Dec 9
Quiz 7 Chapters 25 – 26
Research Paper on an Infectious Disease from the Environment or Bioterrorism Event
Finishing Up