

Microbiology

BIO220-I50/V50

Spring/Summer 2021 (6/7/2021 to 7/26/2021)

Number of Credits: 4

Days Class Meets: Online Course

Meeting Times: Asynchronous course, however, live lectures will be recorded on M & W from 9-11 a.m. every week. Students are strongly encouraged to attend. Office hours will occur immediately following lecture and as needed by appointment via Zoom or the Big Blue Button.

Location/Venue: JetNet on

<https://www.jccmi.edu/>

Instructor: Christy Mecey, Ph.D.

Contact Phone: 517-896-5390 (personal cell)

Contact Email: meceychristyf@jccmi.edu

Online Office Hours: Immediately following lecture on Mondays and Wednesdays or as needed via appointment on Zoom or Big Blue Button. Email or text to make an appointment.

Course Description

Basic structure and function of microorganisms with special emphasis on recent advances in microbiology, pathogens, disease, control and immunity. Strong biology background recommended. Course includes a laboratory component.

Prerequisite(s)

ENG 085 and MAT 020 or higher

Course Goals

This is an introductory microbiology course with an allied health emphasis (though other aspects of microbiology are explored). The course is geared towards meeting a microbiology course requirement for BSN nursing at various transfer schools and is based on the curriculum recommendations of the American Society for Microbiology with regards to an Introductory Microbiology course. The course involves study of various biochemical systems of microbes and incorporates a practical laboratory component with laboratory methodology mastery and hypothesis testing.

Course Objectives

The course goals and objectives incorporate specific General Education Outcomes (GEOs) established by the JC Board of Trustees, administration, and faculty. These goals are in concert with four-year colleges and universities and reflect input from the professional communities we serve. GEOs guarantee students achieve goals necessary for graduation credit, transferability, and professional skills needed in many certification programs. The GEOs and course objectives addressed in this class include the following: GEO2: Communication GEO4 Scientific Reasoning and the objectives stated below.

1. The student will be able to describe in writing the difference between a scientific hypothesis, theory, and law.
2. The student will be able to describe in writing the basic components of the scientific experimental method.
3. The student will be able to list, and discuss using appropriate terminology, the basic tenants of the Modern Synthesis in Evolution.
4. The student will be able to differentiate between the general understanding of microbiology prior to the use of microscopes, during the formation of Germ Theory, during the Golden Age of Microbiology (with emphasis on the difference between German and French Schools of thought), the Antibiotic Age, and make projections pertaining to the Post-Antibiotic Age.

5. The student will be able to apply basic chemical concepts (equivalent to high school chemistry or CEM131) to demonstrate an understanding of basic biochemistry concepts, using the concepts to solve structural problems involving biological macromolecules.
6. The student will be able to identify the major components of bacterial and eukaryotic cells, and differentiate between them.
7. The student will be able to differentiate between Gram-Positive and Gram-Negative bacterial structure, denote exceptions to these standards, and discuss the implications of these differences considering common antibiotics.
8. The student will be able to apply basic chemistry/thermodynamic concepts (as described above) to chemical reactions in biological systems, with emphasis on describing basic enzyme mechanics/pathways and enzyme inhibition.
9. The student will be able to outline the basic metabolism of glucose in a bacterial system using aerobic respiration; lactic acid and ethanol fermentation; anaerobic respiration. Specific enzyme knowledge is not necessary but the economics of energy in metabolism and its connection to secondary metabolism should be evident in mathematical calculations (e.g. the energy content of lipid breakdown).
10. The student will be able to connect the concepts of structure/function relationships to the role of environmental factors on microbe function.
11. The student will be able to distinguish the major chemical elements needed for life, and why they are the major components.
12. The student will be able to describe conditions needed to be controlled for the intentional culture of microbes, and limitations to this approach.
13. The student will be able to describe numerous methods to directly and indirectly quantify microbes.
14. The student will describe the various levels of antimicrobial control and the pros and cons of these levels in real-world situations.
15. The student will be able to describe various forms physical and chemical antimicrobial control and compare their usage scenarios in real world situations.
16. The student will be able to differentiate the sensitivities of the various microbial classes to general antimicrobial strategies and discuss supporting evidence for why.
17. The student will be able to describe, in writing and diagrammatically, the Central Flow of Information in a Cell.
18. The student will be able to describe numerous major milestones in the discovery of DNA as the genetic component in biology.
19. The student will be able to convert genetic sequences between molecular and standard 3'-5' notation, demonstrating an understanding of antiparallel structure, the double helix, and complementarity.
20. The student will be able to process the information of a simple genetic sequence through Replication, Transcription, and Translation.

21. The student will be able to describe the processes of Replication, Transcription, and Translation in terms of basic enzymatic processes (e.g. the roles of the major enzymes, substrates, products, etc.).
22. The student will demonstrate an understanding of mutation on a mechanistic level and in how it affects the information in the genetic sequence.
23. The student will be able to differentiate between the major types of genetic recombination: transformation, conjugation, transduction, and transposons.
24. The student will be able to differentiate between artificial and natural selection.
25. The student will be able to differentiate between the role of selection and mutation in genetic change, with emphasis on topics of medical importance (e.g. antibiotic resistance)
26. The student will be able to describe the basic process of genetic manipulation, including PCR, vectors and host cells.
27. The student will be able to discuss the role that genetic information plays in bioethics discussions in medicine, including genetic therapy.
28. The student will be able describe the current Three Domain system of classification and how it improves on the previous Five Kingdom system.
29. The student will be able to describe the strengths and weaknesses of the current Linnean taxonomy system.
30. The student will be able to use a dichotomous key and experimental data to determine a probable identification for microbes.
31. The student will be able to describe numerous culture-based and culture-independent methods of identification.
32. The student will be able to distinguish the major characteristics of Fungi and differentiate the major pathogenic clades.
33. The students will be able to differentiate between anamorph and teleomorph names in fungi and the role this issue has in medical microbiology.
34. The student will be able to differentiate the major characteristics of Protists and differentiate the major pathogenic clades.
35. The student will be able to differentiate the major characteristics of Parasitic Worms.
36. The student will be able to discuss the implication of eukaryotic pathogens and the close evolutionary relationship with humans (e.g. side effects of antifungals).
37. The student will be able to discuss the arguments for and against considering viruses as lifeforms.
38. The student will be able to describe and differentiate the major structural classifications of viruses.
39. The student will be able to describe the basic reproductive cycle of various viral classes, and discuss why they differ.
40. The student will be able to discuss culture-dependent and culture-independent methods of viral identification.

41. The student will be able to differentiate viral taxonomy from cellular life taxonomy, touching on the evolutionary connection between them.
42. The student will be able to describe oncogenic viruses and their role in cancer.
43. The student will be able differentiate between the different types of symbiosis and its role in microbiota.
44. The student will be able to differentiate between acute, latent, and persistent infections.
45. The student will be able to differentiate between the ways in which a pathogen may be transmitted between hosts.
46. The student will be able to define the basic tenants of epidemiology and its role in preventing disease.
47. The student will be able to define and give examples of emerging infectious disease, with discussion of conditions that cause them to occur.
48. The student will be able to discuss the major events of pathogenesis in a human infection.
49. The student will be able to discuss the concepts of portal of entry and exit for a pathogen and how these affect disease progressions.
50. The student will be able to apply previous objectives to answer various clinical questions of microbial nature.

Textbook

Text Book Zero! This text is available in a digital format. Please see the links posted on our class Jet Net site. This text is available to rent or purchase in digital format through the JC Bookstore.

- OpenStax Microbiology text
- <https://openstax.org/details/books/microbiology>
- All labs will be taught using McGraw-Hill's CONNECT interactive labs. A subscription to CONNECT will be a part of the course fees paid for this course. CONNECT access codes are available through the Jackson College Bookstore. An instructional video for registration and access can be found at this link: <http://video.mhhe.com/watch/vXL3qg9q2E99djXYQKzRD6?>
- You must have a web camera to take exams for this course. They can be purchased from any source including those found on-line, at local stores or the student bookstore.

Extras

- You must have a web camera and microphone to take exams for this course. They can be purchased from any source including those found on-line, at local stores or the student bookstore.
- Interactive laboratory sections in this course will not be compatible with a cell phone interface. A laptop or tablet will be required to complete assignments. There have been issues with using Chromebook and they are not encouraged if you are purchasing a new system.

Exam Process

For students with pre-determined and documented exceptions to regular testing conditions, exams will be offered through the Jackson College On-line Testing Center Services. A webcam and microphone will be required to take exams. You must let me know that you have these circumstances so I am sure to have the documents to the Testing Center. You will be given a window of time to complete an exam.

Extensions for taking exams will not be offered. To take the exam, you will need to make an appointment with the testing center at:

TestingLab@jccmi.edu

The testing center is available to proctor exams by appointment after a request from the instructor has been filed with the Testing Center.

For all other students, we will utilize the Respondus application. To protect the fairness and integrity of the exams, students will be required to take exams using Respondus Lockdown Browser and Monitor. This is an online test proctoring software that requires a download to your computer. Training and practice of Respondus technology will be provided in advance of the first exam. A Mac or PC that has a webcam and microphone is required to use Respondus. If you do not have this technology, please contact your instructor right away. Students are expected to complete the Respondus Practice quiz on time. This is to give our IT department time to help troubleshoot issues **before** exam 1 begins. Failure to complete the Respondus quiz on time may result in instructor-initiated drop.

Grading Procedure

This is a 200-level course that is used by multiple admission committees. As such the grading is considered rigorous and will require out of class effort on the student's part. Overall grade will be determined by the percentage you earn of possible total points, calculated to one decimal point.

EXAMS (~30% of Final Grade): There will be 4 – 100 point exams administered as a part of this course. I will drop the lowest of the four exam scores when calculating final grades.

VIRTUAL LABORATORY ACTIVITIES (~50% of Final Grade): Students will need to reference required laboratory activities on JetNet and the McGraw-Hill CONNECT site. The McGraw-Hill site shows when the activity is open, when it closes (deadline for completion) and total points for each activity.

CASE STUDIES AND OTHER ASSIGNMENTS (~20% of Final Grade): Case studies and other assignments will be required for the course. Those will be posted with required deadlines on the course shell site on JetNet.

A small number of extra credit points will be made available for students participating in Kahoot quizzes that will be offered during live lectures on Mondays and Wednesdays.

Student Responsibilities

How to Succeed in this course:

1. Attend class – participating in weekly live lectures and quizzes will be extremely helpful in achieving a good grade in this course.. Make-up exams will NOT be granted without medical certification or pre-approval from the instructor.
2. Don't get behind. Virtual laboratory sections will require 2-3 hours PER LAB. You will have the opportunity to repeat and correct laboratory activities until you get 100% if you choose to do so. Virtual laboratory activities will comprise at least 50% of the total grade points available for this class. You must complete these activities on time and with proficiency to do well in class.
3. Read the assigned chapters before attending class or watching lectures. With shortened semesters, class lectures can move quite rapidly and only cover part of the material you are required to learn. You will be responsible for all reading and video material that is assigned.
4. Form a study group – Making time to work with a study group on a weekly basis can enable students to share information and discuss topics that they may not feel comfortable discussing in class. I encourage you to reach out to others via JetNet to form an online study group.
5. Plan to spend at minimum 6-8 hours a week reading the text and reviewing the lectures online. Each section of the course will contain several chapters to read along with posted lectures on our Jetnet page.
6. Check your email and our class JetNet page as often as possible, ideally at least once a day. Your classmates and I will be posting things in the discussion forums. In addition, I will also post announcements and video updates frequently.

Grading Scale

GPA	GRADE RANGE
4.0	90-100%
3.5	85-89.9%
3.0	80-84.9%
2.5	75-79.9%
2.0	70-74.9%
1.5	65-69.9%
1.0	60-64.9%
0.5	55-59.9%
0.0	0-54.9%

Failure

Students who do not regularly interact with or complete on-line activities may be in danger of failing the course. **STUDENTS WHO DO NOT COMPLETE FIVE LABORATORY ACTIVITIES OR OTHER ASSIGNMENTS BY THE ESTABLISHED DEADLINES MAY BE DROPPED FROM THE COURSE.**

Academic Honesty Policy

Academic Honesty is defined as ethical behavior that includes student production of their own work and not representing others' work as their own, by cheating or by helping others to do so.

Plagiarism is defined as the failure to give credit for the use of material from outside sources.

Plagiarism includes but is not limited to:

- Submitting other's work as your own
- Using data, illustrations, pictures, quotations, or paraphrases from other sources without adequate documentation
- Reusing significant, identical or nearly identical portions of one's own prior work without acknowledging that one is doing so or without citing this original work (self-plagiarism)

Cheating is defined as obtaining answers/material from an outside source without authorization. Cheating includes, but is not limited to:

- Plagiarizing in any form
- Using notes/books/electronic material without authorization
- Copying

- Submitting others' work as your own or submitting your work for others
- Altering graded work
- Falsifying data
- Exhibiting other behaviors generally considered unethical

Allowing your work to be submitted by others

Accessibility

Jackson College understands that cultivating a broadly diverse community is crucial to our educational mission and to our foundational commitment to leadership and service. Jackson College is fully committed to ensuring our courses are accessible to everyone including those with disabilities. We are currently working to increase accessibility and usability of our course materials in order to meet or exceed the requirements of Section 508 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1991 and Web Content Accessibility Guidelines (WCAG) 2.0. For more information about Jackson College's efforts to ensure accessibility please visit the [Jackson College accessibility web page](#).

If you have an accessibility need in any of our classes please e-mail the Center for Student Success at JCCSS@jccmi.edu or visit the [Center for Student Success web page](#).

At the Center for Student Success (CSS), we are committed to providing all students the opportunity to achieve academic success by providing a variety of support services free of charge to Jackson College students. This includes, but is not limited to, peer and faculty tutoring, mental health referral, temporary assistance with transportation, various workshops/seminars, and the TRIO program.

In addition, the CSS staff is committed to adapting the College's general services to meet the individual needs of otherwise qualified students with disabilities, for the purpose of providing equal access to all programs and facilities.

Course Management

Under extraordinary circumstances, a student can request as Incomplete, to be completed in a timely fashion after the end of the normal term. Incompletes are governed by the JC Policy on Incomplete grades (see JC Policy page on the JC website) and are only given if a small percentage of work is left incomplete, the student is currently passing the class when they request the incomplete, and there is a reasonable expectation the work can be completed within the next term.

Students that have medical issues during the term should discuss the possibility of a medical withdrawal from the course with the Admissions Office.

Makeup Policy

There are no make-up laboratories granted in this class due to the nature of work done. Exams are generally not available for make-up, but under extraordinary circumstances, alternative times prior to the original time may be arranged at the discretion of the instructor. Note, prior planned travel (i.e. leaving for a vacation early) is NOT considered a legitimate reason for alternative times.

Help

Academic Advising

It is important to contact a Center for Student Success professional prior to the start of the semester in order to receive accommodations in a timely manner. While we will make every effort to coordinate accommodations in a timely manner, failure to self-identify prior to the start of the semester may delay notification to instructors and timeliness of acquiring accommodations. Accommodations do not automatically carry over to the next semester. Please e-mail JCCSS@jccmi.edu or visit the [Accommodations for Students with Disabilities](#) web page.

Attendance- Participation Policy

Just as in a traditional classroom course, regular class participation and keeping up on the reading and assignments is strongly correlated with survival in college. It is my recommendation that you plan to do your assignments and take your exams BEFORE the last day they are due. If problems occur, there is time to fix them before the deadline.

In compliance with Federal Title IV funding requirements, as well as college initiatives, I will be monitoring student participation on a regular basis and officially reporting student activity throughout the term to assure compliance with college policy and federal regulations. It is imperative that you log in to the course and actively participate *within the first couple days of the term* to validate your enrollment in the course. After that, not actively participating in class may result in you being withdrawn from the course. Being withdrawn from a course can have an impact on financial aid, billing, athletic eligibility, and housing status. As a college student you are responsible for how your participation impacts your academic progress; the accountability lies with you.

Caveat

Some revisions may be necessary during the course. School closing policies, instructor illness and other procedural improbabilities may result in a rescheduling of class activities. All students will be notified by JetNet in case of such unforeseen circumstances.

Calendar

**Calendar timelines and assignments are an approximation and could be changed. A LIVE ACCURATE CALENDAR OF ALL ACTIVITIES AND ASSIGNMENTS ARE AVAILABLE ON THE JETNET COURSE SHELL FOR BIO 220.*

WEEK #	DATE	TOPIC	CHAPTER	ASSESSMENTS
1	6/7/2021	Nature of Science & Introduction	1	
	6/7/2021	Introduction and History of Microbiology. Emerging Infectious Diseases.	1	
	6/8/2021	CONNECT Virtual Lab: Pre-Lab Activity Tutorial CONNECT Virtual Lab: Lab #1 – Hand Washing CONNECT Virtual Lab: Lab #2 – Lab Safety – Personal Safety CONNECT Virtual Lab: Lab #3 – Applying the Scientific Method		Complete virtual laboratory assessments.
	6/9/2021	Chemical Principles	7	Phet On-Line Worksheet Chemistry in Microbiology Worksheet Week 1 Assignment Questions
	6/10/2021	CONNECT Virtual Lab: Lab #4 – Ubiquity of Microbes CONNECT Virtual Lab: Lab #5 – Aseptic Technique-Broth to Sterile Agar		Complete virtual laboratory assessments.

		CONNECT Virtual Lab: Lab #6 – Aseptic Technique-Broth to Sterile Broth CONNECT Virtual Lab: Lab #7 – Aseptic Technique-Slant to Sterile Slant		
2	6/14/2021	Cell Structure & Function	3	
	6/15/2021	CONNECT Virtual Lab: Lab #9 – Bright Field Microscopy CONNECT Virtual Lab: Lab #10 – Microscopy Oil Immersion		Complete virtual laboratory assessments.
		Exam 1 – Chapter 1, 7 & 3 (Online w/ Respondus – 6/16/2021 – 6/19/2021)		Week 2 Assignment Questions
	6/16/2021	Enzymes and Reactions	8	
	6/17/2021	CONNECT Virtual Labs: Lab #12a through 12e - Staining		Complete virtual laboratory assessments.
3	6/21/2021	Microbial Metabolism	8	
	6/22/2021	CONNECT Virtual Lab: Labs #13a through 13e – Isolation Methods		Complete virtual laboratory assessments. HW - Week 3 On-Line Review Questions
	6/23/2021	Growth of Microbes	9	Antibiotic Resistance Case Study

	6/24/2021	CONNECT Virtual Lab: Lab #14 – Enzyme Activity CONNECT Virtual Labs #15a through 15c – Microbial Growth Connect Virtual Lab #16 – Natural Selection – Antibiotic Resistance in Bacteria		Complete virtual laboratory assessments.
4	6/28/2021	Control of Microbes	13	
	6/29/2021	CONNECT Virtual Lab: Lab #17 – Cellular Respiration – Yeast Fermentation CONNECT Virtual Labs #18a & 18b – Control of Microbial Growth		Complete virtual laboratory assessments. Antibiotic Resistance Case Study Due
		Exam 2 – Chapter 8, 9, & 13 (Available online with Respondus from: 6/30 – 7/1/2021)		
	6/30/2021	Microbial Genetics: DNA Structure/Replication/Protein Synthesis	10	HW - Week 4 On-Line Review Questions
	7/1/2020	CONNECT Virtual Labs 19a-19c – Bacterial Genetics		Complete virtual laboratory assessments.
5	7/5/2021	4 th of July Holiday – No Class		
	7/7/2021	Transcription, Translation and Mutation	11	

6	7/12/2021	Biotechnology	12	
	7/14/2021	Evolution, Taxonomy & Systematics	13	HW - Week 5 On-Line Review Questions
		Exam 3 – Chapter 10-13 (Available online with Respondus from 7/15 – 7/17/2021)		HW - Week 6 On-Line Review Questions
7	7/19/2021	Eukarya	5	
	7/20/2021	CONNECT Virtual Lab #20a through 20d – Identification of Unknown Bacteria		Complete virtual laboratory assessments. Complete Case Study: COVID-19
	7/21/2021 (Lectures Recorded)	Viruses	6	
	7/22/2021 (Lectures Recorded)	Infection & Epidemiology	15 & 16	HW - Week 7 On-Line Review Questions
		Exam 4 – Chapter 13, 5, 6, 15, 16 (Available online via Respondus from 7/23 – 7/25/2021)		

Important Dates:

Spring 2021 Academic Calendar

Event	Dates	Notes
COURSE DATES		
REGISTRATION BEGINS FOR ALL STUDENTS <i>New students must contact Admissions at 517.796.8425 prior to registering for classes.</i>	Feb. 24, 2021	
Semester Dates	May 10 – Aug. 9, 2021	
12 Week Session	May 10 – Aug. 9, 2021	View classes starting May 10
7 Week Session	June 7 – July 26, 2021	View classes starting June 7
5 Week Session	July 6 – August 9, 2021	View classes starting July 6
OTHER DATES		
Memorial Day Holiday	May 29 – 31, 2021	No classes
Independence Day Holiday	July 3 – 5, 2021	No classes