



Introductory Microbiology

BIO220-01

Winter 2019

Number of Credits: 4

Days Class Meets: M/W

Meeting Times: M/W 1-2:30, W 2:30-4:30

Location: JM 131

Instructor: John Ireland, Ph.D.

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Office Hours: See JetNet

Online: See JetNet

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: GEO4 Scientific Reasoning

Textbook

- Microbiology an Introduction by Tortora, Funke, and Case, Pearson, 13th Edition (2018), ISBN: 978-0134605180 (the 12th or 11th Edition should be sufficient)
- Electronic Versions available

Text Book Zero - The textbook is available in a digital format and may be purchased in the bookstore.

Extras

Closed toed shoes must be worn in the laboratory.

Grading Procedure

This is a 200-level course that is used by the admission committee for the JC nursing program (for exact use, consult with the Nursing department). As such the grading is considered rigorous and will require out of class effort on the student's part.

Lecture Portion

- | | |
|---|---------|
| • Best three (3) of four (4) unit exams | 300 PTS |
| • Oral Presentation (laddered) | 100 PTS |

Laboratory Portion

- | | |
|-----------------------------------|---------|
| • Four Laboratory Reports | 40 PTS |
| • Six Laboratory Practical Skills | 60 PTS |
| • Lab Unknown Project | 100 PTS |

Overall grade will be determined by the percentage you earn of possible total points, **calculated to one decimal point.**

All exams will be curved to the lower (non-negative) value of either the curve needed to take the class median to 74% or the curve needed to take the top score to 100% (excluding outliers >2 SD away from the median)

Grading Scale

GPA	GRADE RANGE
4.0	93.0-100%
3.5	85.0-92.9%
3.0	80.0-84.9%
2.5	75.0-79.9%
2.0	70.0-74.9%
1.5	65.0-69.9%
1.0	60.0-64.9%
0.5	55.0-59.9%
0.0	0-54.9%

Failure

Failure to pass either the lab or lecture component of the class will result in an overall failure of the class due to significant failure in content. Failure to take two (2) unit exams or failure to turn in three (3) lab reports and/or practical skills will result in an automatic drop (Q, see below), or failure of the class (Grade of 0.0), if the class is after the last HQV date.

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

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

Available learning services or opportunities for students seeking help with their course work. May include information about tutors, learning centers, reserved library materials, open labs, counseling services.

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.

<https://www.jccmi.edu/center-for-student-success/accommodations-for-students-with-disabilities/>

Calendar

**all dates below are subject to change by the instructor with prior notice, at least one week in the case of major assessments (such as exams).*

WEEK #	DATE	TOPIC	CHAP.	ASSESSMENTS
1	1/14	Nature of Science and Introduction	1	Lab 1 – Hypothesis test and the fingerprint
2	1/21	Chemical Principles	2	Use of the Microscope
3	1/28	Microbe Structure	4	Exam 1 – Chapter 1, 2, 4 (1/30) Gram Stain
4	2/4	Enzymes and Reactions	5	Endospore Stain
5	2/11	Microbial Metabolism	5	Streak Plating Lab 2 – Heat Effects on Growth
6	2/18	Growth of Microbes	6/7	Dilution Plating
7	2/25	Control of Microbes	7	Exam 2 – Chapter 5-7 (2/27) MPN
8	3/4	DNA Structure/Replication	8	Lab 3a – Biochemical Analysis
	3/11	Spring Break		
9	3/18	Transcription, Translation, and Mutation	8	Lab 3b – Biochemical Analysis and key usage.
10	3/25	Biotechnology and Evolution	9	Lab 4 – Fungal Structure
11	4/1	Taxonomy and Systematics	10	Exam 3 – Chapter 8-10(4/1) Finish up Skills and Start Unknowns
12	4/8	Eukarya/Viruses	12/13	Staining and Morphology of Unknown Unknown Key is Due
13	4/15	Epidemiology and Pathogenesis	14/15	Biochemical Testing of Unknown Staining and Morphology Report Due
14	4/22	Pathogenesis	15	Exam 4 – Chapter 10-12 (4/24) Final Lab Unknown Report due
16	4/29	Presentations	-	Oral Presentations

Student Responsibilities

Regular attendance and participation is required for successful completion. This class will also require considerable out of classroom study, reading, and practice. There are no extra-credit assignments.

Attendance Policy

In compliance with Federal Title IV funding requirements, as well as college initiatives, reporting of student participation in classes will occur at three designated times each semester. Instructors will assign one of three non-transcribed letter symbols to each student during each reporting period (see below). Students identified as no longer participating will be dropped or administratively withdrawn from the class, and students identified as needing academic assistance will be contacted.

Participation/Progress Symbols

- H – The student is not doing acceptable work and needs **H**elp to be successful.
- Q – The student has not participated and the instructor believes they have unofficially withdrawn (**Q**uit). These students will be dropped/withdrawn from the class.
- V – The instructor **V**erifies that the student is participating and doing acceptable work.

Caveat

All policies above are subject to change, with notice, by the instructor for reasons the instructor deems necessary (pedagogic issues, school closings, illness of the instructor, etc.).

Reasons for Receiving a Q or H in the HQV System

There are various reasons why I might assign a grade of 'H' during an HQV entry. The most common is that you are attending and participating but need some extra help in the course. The other common reason is that you are doing okay but I see signs that your trajectory in the course is headed downhill (slumping performance, absences, poor lab write-ups).

The reasons for a Q are straight forward.

- You fail to show for the first week of class and do not contact me.
- You fail to attend for five class sessions with explanation offered to me.
- You fail to attend three laboratories
- You fail to take two exams.

If any of these conditions are met before an HQV point you will receive a Q and be dropped from the course (in addition, you will not be reinstated, which I must sign off on). If you meet a condition after the last HQV date you will automatically fail the course with a grade of 0.0 for failure to complete the course.

Lecture Exams

There will be four (4) in class exams during this course. The highest three (3) grades you receive will be counted towards your final grade. The goal of the in-class exams is to gauge your basic understanding, retention and application of the information discussed in class. You will be allowed one and a half hours for the exams, though typically students complete the exams within 45-55 minutes. It is the assumption

that you will be able to not only recall concepts but utilize the information to solve problems presented. The exams will be a combination of the following: multiple-guess, matching, true/false, fill in the blank, problem-solving, diagrams and short answer. Each Unit Exam is worth one hundred (100) points and I count the highest three (3) towards your final grade.

Presentation

Each student will be assigned a pathogen at random early in the term. You will be required to research the organism and complete an informational project dealing with this organism. Details are in a separate packet.

Lab Notebooks and Reports

You are required to keep a lab notebook for the class. This notebook should be a clear, concise and complete record of your lab activities, procedures, results and conclusions. At several times throughout the term you will be requested to submit a short report about the lab you have completed.

The notebook will also serve as your procedural manual, so once you have had a lab experience with a given technique, I will expect you to be able to utilize that technique in the future from your experience and lab notes. **Failure to attend lab, submit the lab notebook, or complete work will result in point deductions, the magnitude of which is at my discretion.**

Lab Unknowns

The lab unknown is the practical capstone of the lab course. You will be using the various techniques and tests that you have worked on over the term to identify an unknown organism from a list of possible microbes. The assignment has several parts and will require some research on your part.

Part 1: Key Development (10 Points)

You will be given a list of the possible microbes for the assignment and a list of available tests you can perform. You will have a week to develop a dichotomous key that allows you to differentiate the known organisms from each other.

Part 2: Gram Stain and Morphology (30 Points)

Since the Gram stain is so important to accurate identification of your organisms each isolate must be Gram stained and the results reported to me by the end of lab the second week of the Unknown. If you are incorrect you will be told the correct results but lose the points. In addition, you will also report on the morphology and endospore status of your organism.

Part 3: Identification (60 Points)

The last step is to set up your biochemical tests and evaluate your organism based on the key you developed. The score is based on the accuracy of your test results, your analysis and final identification.

Lab Skills

Microbiology is a very practical science. To this end you will be evaluated on your ability to accomplish a number of defined laboratory tasks throughout the semester. The assessments and their point values are listed below. Some of the tasks will be accomplished in a single lab session, while others will measure your consistent performance over several trials. The skills will be judged on the following criteria. Please note that while there is a level of subjectivity to these measurements it is based on my experience as an educator and user of these techniques for many years. This type of assessment is common in practical disciplines and will be common in training for health care fields.

Scoring Rubric for Lab Skills

Points	Classification
10	Can complete work without assistance after demonstration and shows excellent characteristics of the skill tested.
8	Can complete work without assistance after demonstration but some flaws in technique are evident.
6	Can complete work with minimal assistance from instructor but final product is correct.
4	Can complete work with minimal assistance from instructor but final product shows flaws.
2	Requires significant input from instructor to complete task in time allotted but task is completed.
0	Work is not completed within the time allotted or shows serious deficit in technique.

Skills Assessed

1. Demonstrate basic use of the microscope to high power
2. Demonstrate use of the oil immersion lens
3. Correctly Gram Stain a set of known samples, as provided by the instructor
4. Correctly Endospore stain a known sample, as provided by the instructor
5. Achieve single-colony isolation on a streak plate (free of contamination) from a sample provided by the instructor.
6. Correctly identify unknown samples by Gram Stain