

Introduction to Microbiology Biol 311 Spring 2024 Syllabus Version 2

Prerequisite: Cell & Mole Bio or Mole Bio and Mole Bio Lab

Please read this syllabus to become very familiar with the logistics of the Lecture and Laboratory components of this course.

Course Description

This course is an introduction to microorganisms and their importance. Principles of structure and function, metabolic diversity, taxonomy, environmental microbiology, and infectious diseases of bacteria are discussed. Newer concepts in microbiology including microbial communities and the microbiome will also be covered. Students will learn how to read and use the primary literature for microbiology. The class will also discuss political and ethical issues associated with microbiology. Basic laboratory techniques: microscopy; staining, culturing, isolation and identification of bacteria will be accomplished using a problem based case method. Isolation and identification of normal flora; antibiotic resistance; metabolic tests; clinical and commercial testing protocols; detection and counting of bacteria in environmental samples (foods, water) and isolation of bacteriophage from the environment. Finally each student will develop a hypothesis about biofilms or another topic approved by Dr. Courtney , test it in the laboratory, and write a report.

Lecture GOS 1250 10 to 10:50 am

Laboratory GOS 1213 Tuesday 9:30 to 12:20, Wednesday and Friday 2:00 to 4:50

Required Textbook: *Microbiology: An Evolving Science* by Joan L. Slonczewski, John W. Foster, & Erik Zinser either 4th or 5th edition. The 4th is less expensive so that is why I am giving you the option of using either book. But I do want you to read a book!!!

Lecture and Laboratory Instructor:

Dr. Mary-Anne Courtney mxcsbi@rit.edu

Dr. Courtney's Office Hours:

Tuesday & Friday 11:30 to 1 pm in person in Color Science 018 1091 or GOS 1213 or Zoom - <https://maryannecourtney50.youcanbook.me>

Dr. Courtney's Zoom availability Monday 4 to 9 pm, Tuesday 2 to 5 pm, Wed 7 to 9 pm, Thursday 10 am to 5 pm, and Saturday 2 to 5 pm.

Learning Goals

| Students at the end of the class will be able to use their knowledge of: | Students in the class will |
|--|---|
| Microorganisms to explain how microbes shape human history. | Determine the origin of an “epidemic”. |
| Bacterial structure and function to explain bacterial growth, development, and control of microbial growth. | Analyze bacteria both macroscopically and microscopically and manipulate bacteria in the laboratory in order to identify them. |
| Bacterial DNA replication, transcription, translation, and protein processing to explain bacterial growth and genome evolution | Analyze food and water for the presence of bacteria and determine the efficacy of various agents as disinfectants. |
| Bacterial regulation to explain how bacteria modulate their biological processes. | Develop an individual laboratory study and submit a paper on the topic. |
| Energetics, catabolism, electron flow, and biosynthesis to elucidate how energy is generated and used in metabolism. | Be able to read, analyze, and digest the primary peer reviewed literature in microbiology. |
| Pathogenic microorganisms to explain how the organisms cause disease and the possibility of future pandemics. | Write two Perusal contributions on topics in microbiology using their ability to use the primary literature. |
| Viruses to illustrate the life cycles of viruses. | Learn to concept map. |
| Microbial ecology diagram how microorganisms are essential for recycling. | Develop a concept map as an individual and contribute to a group concept map. |
| The innate and adaptive immune systems to describe the immune response to various pathogens especially SARS Cov-2. | Work in a group to develop a concept map that explores a topic in microbiology to create a signature project with 3 other students. |

Grading Scheme

| | | | | | |
|----|-----------|------|----|-------------|------|
| A | 934 -1000 | 4.00 | C+ | 767 - 799 | 2.33 |
| A- | 900 - 933 | 3.67 | C | 734 -766 | 2.00 |
| B+ | 867 - 899 | 3.33 | C- | 700 – 733 | 1.67 |
| B | 834 - 866 | 3.00 | D | 600 – 699 | 1.00 |
| B- | 800 - 834 | 2.67 | F | 599 or less | 0.00 |

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| Grade Components | Description | Total Points |
|--|---|--------------|
| Exams | There will be 3 exams worth 100 points made up of 2 short answer questions and 22 multiple choice questions. The lowest grade will be dropped. These exams will be taken on a computer during class time. There are no make-up exams. You may use your book or study guide for these exams. | 200 |
| Weekly Quiz | There will be 10 weekly (no quiz for an exam week) 10 point quizzes. You may use your book or study guide for these exams. But there is a time limit. | 100 |
| Signature Project | The signature project will involve working in a group, delving into the primary literature, developing a concept map, answering a microbiological question and finally give a presentation to the class during the final. | 165 |
| Portfolio of one signature project peer reviewed paper. | Select one of the peer reviewed articles you are using for your part of the signature project and analyze it by producing a concept map of the abstract, cartooning the methods, annotating each figure and table, stating conclusion(s) from each figure and table, and stating what experiment you would do next. | 40 |
| Perusal Contribution (2) Discussions of Perusal Contributions (2) | Each student will produce two Perusal contributions to develop a knowledge base for the class. Each student will also comment and or discuss at least 5 of their peers' contributions for each of the two perusal assignments. The assignment must be downloaded into the assignment box so Dr. Courtney can place it on Perusal. | 80 |
| Class participation - Wednesdays (usually) | Except for exam weeks there will be a session where the class will divide into groups of around 4 students. There will be a work sheet to fill out or a project to turn in or a Perusal article to analyze. | 100 |
| Prelab Quizzes (8) | There will be 8 quizzes to prepare you for each laboratory - must be completed before the lab session. | 80 |
| Lab Book Checks (11) | Before you leave lab you must have a lab book entry that includes the purpose, materials and methods for the labs done that day. | 55 |
| Results & Discussions (11) | There are 11 laboratory exercises -the results and discussion for each one will be written up in the lab book following the purpose, materials and methods written on the day of the exercise. You will be given several weeks to produce the results and discussion. The discussion sections will use at least one reference from a peer reviewed journal. | 88 |
| Lab Practical | The lab practical will consist of situations that mirror the labs done in class. Results will be given and the student will be required to draw conclusions. | 57 |
| Individual Laboratory Project Paper | The last four weeks of lab will require students to develop their own study on biofilms or chemotaxis. They will write a journal like paper on the project. | 55 |

Other Important Information:

1. You are expected to attend each lab session. If you are ill you can make up the lab during one of the other sections of the lab during that week.

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- You will be expected to check on experiments during the week – sometimes this means gathering results and sometimes it will require additional work.
- There will be 3 exams during the course. One of these exam grades will be dropped. There will be NO make-up exams. Missed exams will be scored as zero and become the exam that is dropped.
- Plan ahead for **Exam I**, **Exam II**, and **Exam III**. You will be given a study guide to fill out and you can bring the study guide to the exam.
- Ten weekly quizzes will be required to be completed the Sunday following that week's lectures.
- Each student is expected to participate in the activities during lectures.
- Each student will produce two documents on
- Each student will produce a portfolio of the work they do on the papers we will read for class. You can use your portfolio for exams.
- Each student is expected to read the required readings.
- Please advise me of any special needs during the first week of classes.

| Wk | Date | Lecture Content | Readings | Assignment | Due Date |
|----|--------|---|---|--------------------|---------------------|
| 1 | W1/17 | Course Introduction. Microbiome (in class) | Ch24 922-936 | Prelab wk 1 quiz | Before lab |
| | F 1/19 | Microbial Family Tree. Significance and History of microbiology | Ch1 1-7, 10-19, 20-28 | Quiz Set 1 | Sun 1/21- 11:59 pm |
| 2 | M 1/22 | Bacterial Structure | Ch3 75-79,82-95,96-97 | Prelab wk 2 quiz | Before lab |
| | W 1/24 | Bacterial Cell Division Bacterial Structures Environment & Control(<i>in class</i>) | Ch3 97-105, 106-115 Ch5 160-176 | Quiz Set 2 | Sun 1/28 - 11:59 pm |
| | F 1/26 | Growth Cycle -Batch Culture Chemostat, Biofilm | Ch4 140-150 Ch5 160-192 | | |
| 3 | M 1/29 | Bacterial Growth - Bacterial Differentiation | Ch4 124-130 Ch4 151-156 | Quiz Set 3 | Sun 2/4 - 11:59 pm |
| | W 1/31 | DNA replication (<i>in class</i>) | Ch7 251-260 | Microbiome Perusal | Sat 2/03 - 11:59pm |
| | F 2/2 | Plasmids & 2 ^o Chromosomes Microbiomes & Metagenomes | Ch7 249-250 Ch7 261-266 Ch7 268-272 | | |
| 4 | M 2/5 | Transcription & Translation | Ch8 277-313 | Prelab wk 4 quiz | Before lab |
| | W 2/7 | Regulation I | Ch10 357-379 | Peer Contract | Monday 2/6 |

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| Wk | Date | Lecture Content | Readings | Assignment | Due Date |
|----|--------|---|--|---|--|
| | F 2/9 | Regulation II, Regulation Activity (in class) | Ch10 380-397 | due. Perusal Discussion | Sat 2/10 - 11:59pm |
| 5 | M 2/12 | Exam I | | Signature Assignment | Should happen before 2/28. |
| | W 2/14 | Energetics & Catabolism | Ch13 487-500, Fig13.12,13.13 505-514, 520-530 | Individual Formative Assessment | |
| | F 2/16 | Electron Flow | Ch14 535-550, 553-557, | | |
| 6 | M 2/19 | Biosynthesis | Ch15 582-594, 600-607 | Prelab wk 6 quiz | Before lab |
| | W 2/21 | Metabolism Team Activity (in class) | | Quiz Set 4 | Sun 2/25 - 11:59 pm |
| | F 2/24 | Viruses I - Bacteriophage | Ch6 215-222 Ch11 406-409 | | |
| 7 | M 2/26 | Viruses II - General Characteristics | Ch6 196-214 | Prelab wk 7 quiz | Before lab |
| | W 2/28 | Ebola Exercise (in class) | | Quiz Set 5 | Sun 3/3 - 11:59 pm |
| | F 3/1 | Viruses III - Molecular Aspects | Ch6 222-242 Ch11 431-435 | | |
| 8 | M 3/4 | Virus IV - Influenzas, HIV, SARS Cov-2 | Ch11 410-431, 435-441 | Prelab wk 8 quiz | Before lab |
| | W 3/6 | Review Mutation & Repair Microbial Genetics I - Transformation (in class) | Ch9 316-329, 337-340 | Quiz Set 6 Portfolio | Sun 3/17 - 11:59 pm Mon 3/20 turn in during class |
| | F 3/8 | Microbial Genetics II - Conjugation & Transduction | Ch9 329-337, | | |
| | | Spring Break 3/10 -3/17 | | | |
| 9 | M 3/18 | Mobile Genetic Elements | Ch9 343-348 | Prelab wk 9 quiz | Before lab |
| | W 3/20 | Origins and Evolution | Ch9 348-353 Ch17 660-663,671-6 75, 681-690 | | |
| | F 3/22 | Exam II | | | |
| 10 | M 3/25 | Host Defense - Innate immunity I | Ch24 936-945, | Prelab wk 10 quiz | Before lab |
| | W 3/27 | Host Defense - Innate Immunity II (in class) | Ch24 945-957 Fig24.29, 959-960 | Quiz Set 7 | Sun 3/31 11:59 pm |
| | F 3/29 | Host Defense - Adaptive Immunity I | Ch24 964-981 | | |
| 11 | M 4/1 | Host Defense - Adaptive Immunity II | Ch24 982-1008 | Quiz Set 8 | Sun 4/7- 11:59 pm |
| | W 4/3 | Host Defense - (in class) | | Immunology Topic Perusal | Sat 4/6 - 11:59pm |
| | F 4/5 | Microbial Pathogenesis I | Ch25 1012-1024 | Signature Assignment Group Formative Assessment | Should happen before 4/12. |

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| Wk | Date | Lecture Content | Readings | Assignment | Due Date |
|----------------------------------|--------|--|--|---|--|
| 12 | M 4/8 | Microbial Pathogenesis II | Ch25 1025-1048 | Prelab wk 10 quiz | Before lab |
| | W 4/10 | Water & Food Borne Diseases (<i>in class</i>) | Ch25 1048-1051 Ch26 1072-1083 | Quiz Set 9 Perusal discussion | Sun 4/14- 11:59 pm Sat 4/13 - 11:59pm |
| | F 4/12 | Airborne & Direct Contact Infections | Ch26 1059-1071 | | |
| 13 | M 4/15 | Sexually Transmitted Infections | Ch26 1083-1092 1097-1104 | Quiz Set 10 | Sun 4/21- 11:59 pm |
| | W 4/17 | Vector Bourne - Zoonotic Infections (<i>in class</i>) | | | |
| | F 4/19 | Epidemiology - <i>And the Band Played On</i> | Ch28 1187-1200 | | |
| 14 | M 4/22 | Microbial Ecology and Element Cycles | | | |
| | W 4/24 | Environmental Microbiology | Ch21 827-833, 838-848, 851-857, 872, 872-880 Ch22 883-885, Fig22.4, 22.5, 22.17, 22.22 | | |
| | F 4/26 | Food & Industrial Microbiology | Ch16 618-636 Table16.4 | | |
| | M 4/29 | Exam III | | | |
| | | Final Exam Time - Presentations | | | |
| | | Signature Assignment Due | | Signature Assignment | Wed 5/8 |
| Final Grades Due Friday May 10th | | | | Peer Assignment | Wed 5/8 |

Perusall Contributions – 80 points

There is a Perusall part of this class. Use this URL to get to the site <https://app.perusall.com/join/courtney-7gt2v>. The student enrollment code is COURTNEY-7GT2V. I think I have enrolled you all - we will see. You will be required to post significant material 2 times during the course – each of these will be worth 30 points. Each post must be supported by significant references (**No Wikipedia is not an acceptable source but you can start there and use their references from peer reviewed journals**). If someone asks a question about your post you are expected to respond if the question is asked before the Saturday the discussion is due or you will lose points. Each contribution must be submitted to the assignment drop box and then Dr. Courtney will place them on the Perusall site. You will also be expected to engage in discussion with other postings. In other words you are to read the Perusals and respond. Each discussion of other postings will be worth 2 points. In order to

score the full 2 points the discussion must be significant. Not just “your Perusal was excellent.” You can get 10 points – that means you will respond to 5 Perusals for full credit.

The purpose of the Perusal is to allow you to dig deeply into a particular topics, hone your skills of researching a topic, improve your scientific writing and finally improve your critical thinking as you evaluate the postings of others and come up with questions or further insight.

Perusal Assigned Topics: Everyone Perusal must be original – that is I do not want to see two on the same topic. Select your topic and place it into the appropriate discussion thread. All

1. **Microbiome** - due Saturday February 3rd at 11:59 pm. Some possible choices in a list after this section.
2. Microbiome discussion due Saturday February 10th at 11:59 pm.
3. **Immunology** discuss some topic of immunology that you find interesting - due Saturday April 6th at 11:59 pm. Some possible choices in a list after this section.
4. Immunology discussion due Saturday April 13th at 11:59 pm.

Rubric for Perusal Contributions – Worth 30 points

| Topic - 4 | 4 - Interesting, timely | 3 - Fairly interesting and timely | 2 - Somewhat interesting | 0 - Not a great topic |
|-------------------------|--|---|--|--------------------------------------|
| Content - 6 | 6 - The content is correct and up to date. | 4 - The content is correct but not up to date. | 2 - There are some errors in the material. | 1 - Content poor. |
| Depth - 8 | 8 - The topic is explored in depth. | 6 - The topic is explored with some depth. | 4 - The topic is explored but only in general. | 1 - Very brief exploration of topic. |
| References - 12 | 12 - At least 9 references, cited correctly, referred to in the body of the contribution. At least 3 are primary peer reviewed literature. | 8 - At least 6 references, cited correctly, at least 2 references are primary literature. | 4 - Some references. | 0 - No references. |
| Response to colleagues. | You will lose 2 points for each question you do not answer. This refers to all questions posed during the week of discussion. Those asked after that time do not need to be answered - but would be nice to keep the discussion going. | | | |

Rubric for Perusal Discussions – Worth up to 10 points if you do five.

| | | |
|------------|---|--|
| Discussion | 2 - Interesting, insightful, adds to the discussion of the topic. | 1 - Does not add to discussion of topic. |
|------------|---|--|

Microbiome Possible Topics – Perusall 1

human intestinal microbiome
human skin microbiome
microbiome and obesity
microbiome and autism
microbiome and allergies
microbiome and diabetes
microbiome and inflammatory bowel disease
microbiome and eczema
ocean microbiome
earth microbiome project
microbiome and antibiotics
altering human microbiome
NIH human microbiome project
Microbiome and digestion of complex carbohydrates
Why does the presence of *Firmicutes* lead to obesity?
Why does the presence of *Bacteroidetes* lead to thin people?
What nutrients do the bacteria in our gut provide?
Do the organisms in yogurt really promote health?
What is the difference between probiotics and prebiotics? Significance?
How can “good” bacteria be introduced?
How does the microbiome effect the development of the immune system?

Possible Questions or topics about the Immune System – Perusall 2

Describe and explain the mechanical aspects of the constitutive immune response.
Describe and explain the chemical aspects of the constitutive immune response.
Describe and explain the physical aspects of the constitutive immune response.
Describe and explain the microbiological aspects of the constitutive immune response.
How does the complement system function to combat infection?
How does interferon function to combat infection?

How does inflammation increase host defenses at the site of infections?

Name and describe the phagocytic cells involved in both types of the immune response. (I am thinking of two).

How do natural killer cells destroy virus-infected host cells?

How does RNA interference help with the immune response?

Describe what B cells do in the immune response. How do they help the immune system achieve specificity and memory?

Describe what T cells do in the immune response. How do they help the immune system achieve specificity and memory?

Define humoral immunity.

Define cellular immunity.

Why does the immune response system recognize only foreign molecules?

Compare and contrast MHC I and MHC II.

What is the role of the lymph nodes in the adaptive immune response?

What is the role of the bone marrow in the adaptive immune response?

What is the role of the thymus in the adaptive immune response?

What is the role of the spleen in the adaptive immune response?

What is the role of GALT in the adaptive immune response?

What are antigen presenting cells? Which cells are antigen presenting cells?

Define antigen without using the word antibody.

Define antibody without using the word antigen.

What is clonal selection when referring to the adaptive immune response?

How do intracellular pathogens gain access to the interior of their host cells?

How do bacteria protect themselves from being killed in the phagolysosome?

How is antigenic variation caused?

What is a vaccine?

Define a live vaccine, how it works, how long it works and give some examples.

Define a dead or attenuated vaccine, how it works, how long it works and give some examples.

Define a subunit vaccine, how it works, how long it works and give some examples.

Describe one of the new types of vaccine under development, how it works, what you think of it.

Does having a disease provide longer lasting immunity than being immunized? Who or Why not?

Explain allergy and why IgE is involved and not IgG.

Why do we reject a kidney from everyone but an identical twin?

Perusal. COURTNEY-7GT2V. <https://app.perusall.com/join/courtney-7gt2v>

Signature Assignment.

The signature assignment will be used to replace a final exam. It will be an assignment that will span the entire semester. In the second week you will be in your final group and during the in class time on Wednesday you will start to decide what topic your group will explore. You will ultimately divide the project into 4 parts with each student taking on one aspect and developing a concept map (you can use cMAP unless you have another program you would like to use) on that aspect. Additionally you will fill out a team contract that will allow you to state the team's goal, team procedures, team expectations, and individual responsibility. This will be due February 2nd.

There will be two formative assessments of your work during the semester. By definition a formative assessment is an in-process evaluation of student comprehension, learning needs, and what future work should include. The first formative assessment will happen the after the first exam and should be completed February 28th. Each student individually will meet with Dr. Courtney using <https://maryannecourtney50.youcanbook.me> to set up an appointment or you can come to her office on Wednesday or Friday between 11:30 and 12:30 pm. Each student will present their concept map and discuss with it with Dr. Courtney. The second formative assessment will take place after the second exam and should be completed by April 14th. This time the whole group will meet with Dr. Courtney. Each group will give a presentation of their project on during the final exam period. The finished Signature Assignment will be turned in by April the 29th. This will include the following items 1) Individual Concept Map (75 points), 2) Group Concept Map (20), 3) Group Presentation (25 points) and 4) Peer review (lose points if you do not turn it in). The additional 30 points come from the individual and group formative meetings.

Individual Rubric for Signature Project

| Component (75) | Full credit | 2/3rd credit | 1/3rd credit | Comments |
|--|------------------------|-----------------------------|---------------------------|--|
| Primary Individual Topic - (10) | Major concept based in | Minor concept for molecular | Not an important concept. | Since you can check with Dr. MAC there is no reason not to get full credit for this component. |

| Component (75) | Full credit | 2/3rd credit | 1/3rd credit | Comments |
|---|--|---|---|---|
| Concepts explaining the topic - (25) | There are at least 20 squares - each of which can be | There are 13 squares - each of which can be considered a | There are 7 squares - each of which can be considered a | If you are using Cmap this means your primary topic would be in the middle and you would have at least 20 squares off of it. They need not be directly connected to the central topic - but can come off of one |
| Connections between concepts - (10) | Connections link at least 10 of the concepts to at least 3 | Connections link at least 7 of the concepts to at least 3 | Connections link at least 4 of the concepts to at least 3 | If using Cmap you see that when you link one concept to another there is a space to put a verb or word connecting the two squares. There should be more connections between the squares than just |
| Resources - (10) | At least 10 pictures, videos, or diagrams. | At least 7 pictures, videos, or diagrams. | At least 3 pictures, videos, or diagrams. | As you work with Cmap you will find there are ways to connect pictures and diagrams. If you use the Cloud version you add them differently than if you download the program and do your concept mapping |
| References - (15) | At least 15 references at least 6 must be primary | At least 10 references at least 4 must be primary | At least 5 references at least 2 must be primary | You may use references from textbooks, printed magazines and newspapers, the internet - if you can site the author and the reason you think it is a good reference. |
| Peer Evaluation (10) | Average of your peer's evaluation. | | | You will lose points from this score if you do not provide evaluations to your peers. If you are on your own - you will do a self evaluation and Dr. MAC will evaluate your |

Group

| Component (20) | Full credit | 2/3rd credit | 1/3rd credit | Comments |
|---|---|---|----------------------------|---|
| Primary Topic - (10) | Major concept based in | Minor concept for molecular | Not an important concept. | Since you can check with Dr. MAC there is no reason not to get full credit for this component. |
| Central concept map that will connect the individual concept maps. (5) | A central small concept map that has arms off of the primary topic connecting at several levels | A central small concept map but only 1 connection to each of the individual concept | No central concept maps. | This is the place where you will have to work as a group to get this together. The individual concept maps end up being too large to combine onto one document. So this smaller map will have links off to the individual - which won't be visible — but if I print them out I will be able to put them all together. |
| Evidence of good group work (5) | In group meeting everyone was there and | Not everyone turned up for group meeting - could | No evidence of group work. | This will be a bit tricky - it depends on what I see in group meetings and how you all worked to bring all the maps together. |

Group Presentation

| Component (25) | Full credit | 2/3rd credit | 1/3rd credit | Comments |
|--|---|---|---|--|
| Slides (15) | Not too many words, use of pictures or diagrams | Too many words on slides or no pictures or diagrams | Too many words and no pictures or diagrams. | A slide should get your point across - but it should just help get across your major point. These can be checked with Dr. Courtney - so no excuse not to get full |
| Significant ideas (5) | You have gotten across an interesting idea or point | There are slides without a significant point. | No significant ideas. | This is the place where you will have to work as a group to get this together and make sure every member got to make a major point. |
| Evidence of good group work (5) | The presentation shows continuity. | Some sections do not seem connected. | There is no connection among the parts of the | This is the place where you will have to work as a group to get this together - but you can go over the presentation with Dr. Courtney before hand so it should not be a |

Portfolio – 40 points

The portfolio will reflect the work you have done to read, analyze, and interpret data from one of the primary research articles you are using for your part of the signature project. This work will include concept mapping the paper's abstract, cartooning methods, annotating figures from papers, analyzing data, and discussions of the paper's data. There is a slide show on how to do the portfolio on mycourses.

| Rubric for the Portfolio | | | | |
|------------------------------|---|---|--|--|
| 8 - Concept Map of abstract. | 8 - Contains all the major concepts & they are inter-connected appropriately. | 6 - Most of the major concepts & they are connected. | 4 - Just a few of the major concepts and poor linkage. | |
| 8 - Cartoon of methods. | 8 - Methods are cartooned and placed on the same page as the figure or table the method produced. | 6 - All the methods are cartooned. | 4 - Only a few of the methods are cartooned. | |
| 10 - Annotations | 10 - Each figure & table has every aspect labeled in a clear manner that is easy to understand. | 7 - Each table & figure has most aspects of each table & figures clearly labeled. | 4 - Only a few of the aspects of the tables & figures are pointed out. | |
| 10 - Conclusions | 10 - There is a clear & acceptable conclusion for each table and figure. | 7 - A point is removed for each missing conclusion. | | |
| 4 - Next experiment | 4 - The experiment logically follows the work from the paper. It has some detail. | 2 - An experiment that follows from the work in the paper. | | |

The Laboratory

The laboratory is designed to give you the tools to work with bacteria. You will learn to isolate and identify bacteria. You will have the opportunity to do tests to determine the effectiveness of disinfectants. You will also look at the microorganisms found in food and water. Finally you will design experiments to explore the nature of biofilms.

| Week | Exercise | Quizzes | Lab Book Check | R & D Check |
|---------------|--|----------------|----------------|----------------------|
| 1 1/14/24 | Ex 1: The Epidemic, Ex 2: Macroscopic Evaluation of Microorganisms | Wk 1 Lab Quiz | Yes | |
| 2 1/21/24 | Ex 3: Micro Evaluation of Microorganisms. Ex 4 Find an Unknown Organism to ID | Wk 2 Lab Quiz | Yes | |
| 3 1/28/24 | Ex 3: Micro Evaluation - spore stain Ex 5: Pure Culture | | Yes | Epidemic |
| 4 2/04/24 | Ex 5: Pure Culture cont. Ex 6: Gram Positive Identification Tests | Wk 4 Lab Quiz | Yes | Macro |
| 5 2/11/24 | Ex 4: Pure Culture cont. Ex 5: Gram Pos cont. Ex 4: ID unknown Ex 7: Inoculate Gram Negative Rod Tubes | | Yes | Micro |
| 6 2/18/24 | Ex 4: Inoculate Kirby Bauer Plate with Unknown Ex 7: Gather Results of Gram Negative Rods | Wk 6 Lab Quiz | Yes | |
| 7 2/25/24 | Ex 4: Collect Kirby Bauer Data Ex 8: Disinfection Assay | Wk 7 Lab Quiz | Yes | Gm Pos |
| 8 3/03/24 | Ex 8: Collect Disinfection Assay - Repeat if necessary Ex 9: Inoculate Water Assay | Wk 8 Lab Quiz | Yes | Gm Neg |
| 3/10/24 | Spring Break | | | |
| 9 3/17/24 | Ex 9: Collect Water Data Ex 10: Food Assay | Wk 9 Lab Quiz | Yes | Pure Culture |
| 10 3/24/24 | Ex 11: Chemotaxis Begin Individual Project on Biofilms or Chemotaxis | Wk 10 Lab Quiz | Yes | Disinfection Unknown |
| 11 3/31/24 | Ex 11 Biofilms or Chemotaxis | | Yes | Water |
| 12 4/07/24 | Ex 11: Biofilms or Chemotaxis | | | Food |
| 13 4/14/24 | Ex 11: Biofilms or Chemotaxis | | | Chemo-taxis |
| 14 4/22/24 | Lab Practical | | | Individual Project |

The laboratory will be graded using prelab quizzes, the lab book, a report on the case that you did on the first day, and a lab practical.

1. There are 8 quizzes. There will be a quiz before the start of each new exercise. The quizzes need to be done before you come to lab. You will need the lab protocol to answer the questions on the quiz. Since there is not a quiz each week – keep track so you do not miss one.
2. At the **end of each class you must have your lab book checked**. We will check to make sure you have a purpose, materials, methods, and any data that was collected that day. You **are not** to print the procedure and just paste it in the lab book. Each check is worth 5 points.
3. You are expected to collect data and then present this data in appropriate format – that is tables or figures. You are also expected to write a discussion of the results and use at least **one reference properly cited in each discussion**. These will be due the week or so after all the data is collected. The expectations for these are found right after this section on the lab.
4. There will be a lab practical. You may use your lab book for the practical.

What makes a good lab book according to MAC?

Rules for a Keeping A Good Lab Book

1. Place your name on the front of your lab book.
2. Make a **table of contents** - with the exercise names and pages. If you have appendices you should list them here too.
3. Each lab should contain the following parts
 - a. Purpose should only be a sentence or two - be very concise - no details - just clearly and simply what the purpose of the exercise is.
 - b. Materials list all the materials in the lab. However if you use a piece of equipment you don't usually use - list it. A list form is much better than a paragraph.
 - c. Methods step by step - remember someone who finds this lab book 50 years after the asteroid has destroyed much of our industrial life - is trying to start a micro lab - only has your book as a guide. Possibly unearthed from a landfill where you dumped it after college.

- d. Results just results - no interpretation. But first you must have the rough data - the data as you collect it. Then if possible present data in tables or figure or drawings - this is what should be in the results section. Make sure your figures and tables have a numbered name, title, and legend. (For example- Figure 1. **How to label your figures.** The rules you should follow for labeling your figures is stated here.) You may use your computer to make figures etc. But the originally collected data must be in the lab book.
 - e. Discussion this is where you go back to the purpose and discuss if you fulfilled it. You also talk about anything that may have gone wrong. If something - like a stain doesn't work then you better have some good reasons why. Also discuss the implications of the lab. For example in discussing the Gram stain you could discuss the differences between Gram pos and Gram neg, how the stain works, why the stain is useful, what are the pitfalls - I am really looking for some creativity here - lets me write nice letters of recommendation. Also you must have a reference correctly cited for each discussion – you may use more than 1 reference.
4. Most times the results and discussion will not be available to be graded until a week or two later - noted on the lab schedule.

Points

- 1. Each lab period your lab book will be graded to determine if you have the purpose, materials, and methods for each exercise you have done that day. This review is worth up to **5 points**.
- 2. After there has been time to gather data, display results, and write discussions this part of the lab book will be graded. This is worth 8 points. The results will be worth 4 points, discussion 3 points, and 1 point for the reference.

Results and Discussions for ITM Spring 2022

Here is a list of the exercises and a guide on what the results and discussions should be. They will be graded by the TA's. The dates the results and discussion are due can be found on the laboratory schedule.

Ex 1. Epidemic **Results (4)** must be the chart with the contact information that was collected from the class and as well as the results. Should have a statement of who you think started the epidemic - if you can't determine patient zero - state that and explain why in the discussion..

Discussion (3) this should include a discussion of how you reached your conclusion – your thinking process. There should be some discussion about how fast a disease could be spread – some mention of a real epidemic. I would not be surprised to see you mention Covid 19.

Reference (1) that discusses most anything about epidemics will do. Must refer to it in your discussion.

Ex 2. Macroscopic Observations **Results (4)** should have pictures, or table or written descriptions of the colonies of the 6 organisms.

Discussion (3)– I expect you to compare and contrast the culture morphology for the various organisms. You should discuss how useful colony morphology is for distinguishing among organisms. Should also look up information about each organism. Give a brief “biography”. This is an opportunity to make each organism your own. **Reference (1)** – you should use references to characterize these organisms.

Ex.3. Staining of Bacteria for Microscopic Observation of organisms. **Results (4)** –should have drawings or descriptions of the results of each Gram stain you did. You should also have a table that has the organism, the Gram reaction, the shape of the individual organisms and the colony morphology. **Discussion (3)** – should include thoughts about what combining staining and microscopic observations with colony morphology does to your ability to ID bacteria. Should also look up information about each organism you have not characterized before. This is an opportunity to make each organism your own. **Reference (1)** – you should use reference(s) to characterize the organisms.

Ex 4. Unknown organism including Kirby-Bauer . **Results (4)** should develop a table that contains all the information and tests you did to ID the organism. Should develop a table that contains your findings with the Kirby-Bauer results. Should include macroscopic (on different medias) and microscopic descriptions, pictures if you want, what tests you did and the results of a Biolog test.

Discussion (3) - should include thoughts about the organism you isolated, where it came from - was

that expected? Any problems with the identification. **Reference (1)** – you should use reference(s) to characterize the organism you isolated.

Ex.5. Pure Culture Isolation. **Results (4)** should have a picture or drawing of the plate with the 4 organisms – and a statement that you were able to isolate the 4 strains. Dr. Courtney - needs to check the plate. **Discussion(3)** – should include something about how you got the isolates and how they could distinguish among the 4 organisms - should include the use of differential and selective media and how they helped or hindered. Should mention if there were any difficulties. Should point out the importance of having pure cultures. Should also look up information about each organism you have not characterized before. This is an opportunity to make each organism your own. **Reference (1)** – you should use reference(s) to characterize the organisms.

Ex. 6. Identification of Gram positive Bacteria. **Results (4)** - should have a table of your unknown and your identification with the key tests involved in that identification. Include the role of selective and differential media. **Discussion (3)** should discuss the general scheme you used to ID the organisms. This may include a chart or table or flow chart. Discussion should include any problems with the identification and why you think identification is important. Should also look up information about each organism you have not characterized before. **Reference (1)** – you should use references to characterize the organisms.

Ex. 7. Identification of Gram negative rods. **Results (4)** - should have a table of your unknown and your identification with the key tests involved in that identification. Include the role of selective and differential media. **Discussion (3)** should discuss the general scheme you used to ID the organisms. Discussion should include any problems with the identification and why you think identification is important. Should also look up information about the organism that was your unknown. **Reference (1)** – you should use references to characterize the organisms.

Ex. 8. Disinfection **Results (4)** – should include a table with your personal results in detail. Should include a table of the class' results. **Discussion(3)** – should include your thoughts on what you found and your thoughts on any discrepancies in the class data. Should include your thoughts on the effectiveness of the disinfectants – your thoughts on when it is appropriate to use disinfectants –

when it is not appropriate and maybe even dangerous. **Reference (1)** – choose from on any of the discussion topics.

Ex. 9. *Water* **Results (4)** should include a table on the class data on water. **Discussion (3)** should include a discussion of any discrepancies. Should discuss your thoughts on the level of organisms found in the various water samples. You should state what are the acceptable levels by the government. Discuss and surprises good or bad about what you found. **Reference (1)** –choose from on any of the discussion topics.

Ex. 10. *Food*. **Results (4)** should include a table on the class data on the food samples. **Discussion (3)** should include a discussion of any discrepancies. Should discuss your thoughts on the level of organisms found in the various food samples. You should state what are the acceptable levels by the government. Discuss and surprises good or bad about what you found. **Reference (1)** –choose from on any of the discussion topics.

Ex. 11. *Chemotaxis* **Results (4)** should include a table on the findings of your chemotaxis experiments. **Discussion (3)**. Discuss your findings. **Reference (1)** –choose from on any of the discussion topics.

The academic demands in this course and your other classes can be understandably difficult. It is normal to feel anxious about your academic ability, especially when unexpected life events emerge. I want to invite you to connect with me about any difficulties you have in this course as soon as possible. Your success is important. I want you to get the additional assistance needed before the challenges become too much

As an institution of higher learning, RIT expects students to behave honestly and ethically at all times, especially when submitting work for evaluation in conjunction with any course or degree requirement. The Gosnell School of Life Sciences encourages all students to become familiar with the [RIT Honor Code](#) and with [RIT's Academic Honesty Policy](#).

RIT Honor Code URL: <http://www.rit.edu/studentaffairs/studentconduct/RITHonorCode1.htm>

RIT Academic Honesty Policy URL: http://www.rit.edu/studentaffairs/studentconduct/rr_academicdishonesty.php

Introduction to Microbiology

RIT is committed to providing reasonable accommodations to students with disabilities. If you would like to request accommodations such as special seating or testing modifications due to a disability, please contact the Disability Services Office. It is located in the Student Alumni Union, Room 1150; the Web site is www.rit.edu/dso. After you receive accommodation approval, it is imperative that you see me during office hours so that we can work out whatever arrangement is necessary.

In this course, we will develop a community that is inclusive and respectful. Our diversity may be reflected by differences in race, culture, age, religion, sexual orientation, socioeconomic background, and numerous other social identities and life experiences. The goal of inclusiveness, in a diverse community, encourages and appreciates expressions of different ideas, opinions, and beliefs. A dedication to inclusiveness requires respecting what others say, their right to say it, and the thoughtful consideration of others' communication. Both speaking up and listening are valuable tools for furthering thoughtful, enlightening dialogue. Respecting one another's individual differences is critical in transforming a collection of diverse individuals into an inclusive, collaborative and excellent learning community.

General Course Policies

Academic Integrity Statement

As an institution of higher learning, RIT expects students to behave honestly and ethically at all times, especially when submitting work for evaluation in conjunction with any course or degree requirement.

RIT Online encourages all students to become familiar with the RIT Honor Code and with

RIT's Academic Integrity Policy.

Do not cheat. Avoid the appearance of cheating in this class. Do not allow others to cheat from you.

D.08.0 Student Academic Integrity Policy

IV. ACADEMIC INTEGRITY A breach of student academic integrity falls into three basic areas: cheating, duplicate submission and plagiarism

A. Cheating: Cheating is any form of fraudulent or deceptive academic act, including falsification of data, possessing, providing, or using unapproved materials, sources, or tools for a project, exam, or body of work submitted for faculty evaluation.

B. Duplicate Submission: Duplicate submission is the submitting of the same or similar work for credit in more than one course without prior approval of the instructors for those same courses.

C. Plagiarism: Plagiarism is the representation of others' ideas as one's own without giving proper attribution to the original author or authors. Plagiarism occurs when a student copies direct phrases from a text (e.g. books, journals, and internet) and does not provide quotation marks or paraphrases or summarizes those ideas without giving credit to the author or authors. In all cases, if such information is not properly and

accurately documented with appropriate credit given, then the student has committed plagiarism.

If you are caught cheating on any assignment or exam, appropriate academic disciplinary action will be taken to the fullest extent allowed by the University. Refer to your “Students Rights and Responsibilities” handbook for further guidance on the Academic Dishonesty policy at RIT
<https://www.rit.edu/academicaaffairs/policiesmanual/d080>.

Statement on Reasonable Accommodations

I am committed to providing academic adjustments to students with disabilities. If you would like to request academic adjustments such as testing modifications due to a disability, please contact the Disability Services Office (DSO). Contact information for the DSO and information about how to request adjustments can be found at <https://www.rit.edu/disabilityservices/>. After you receive academic adjustment approval, it is imperative that you see me during office hours or schedule an appointment with me so that we can work out a suitable arrangement.

Starfish

This course participates in the RIT Starfish academic alert system, which is designed to promote student success through communication between students, instructors, and advisors. I will send a whole-class status update to all students before the semester midpoint. When I am concerned about an individual student’s academic performance, I may raise an academic alert to notify the student as well as their advisor(s). On the other hand, when a student is doing well, I may send a “kudos” message. If you receive an academic alert email, it is your responsibility to contact me as soon as possible to discuss the issue, its potential impact on your success in the course, and identify people and resources to help you move forward. For more information about the Starfish system, visit <http://www.rit.edu/starfish>.

Statement on Title IX

Title IX violations are taken very seriously by me, and RIT. RIT is committed to investigate complaints of sexual discrimination, sexual harassment, sexual assault and other sexual misconduct to ensure that appropriate action is taken to stop the behavior, prevent its recurrence, and remedy its effects. Please view the Title IX Rights and Resources at RIT.

Online Safety

I am committed to educational access for all. RIT’s students come from all walks of life and have diverse life experiences. As with any other online community, the lack of physical interaction in an online classroom can create a false sense of anonymity and security. While one can make new friends online, digital relationships can also be misleading. Good judgment and decision making are critical when choosing to disclose personal information with others whom you do not know, which will likely include individuals within our class for you.

Course Copyright Policy

All course materials students receive or to which students have online access are protected by copyright laws. Students may use course materials and make copies for their own use as

needed, but unauthorized distribution and/or uploading of materials without the instructor's express permission is strictly prohibited. RIT Policy C03.2 Copyright Policy addresses this issue (<https://www.rit.edu/academicaffairs/policiesmanual/c032>).

For example, uploading completed labs, homework, or other assignments to any study site constitutes a violation of this policy. Students who engage in the unauthorized distribution of copyrighted materials may be held in violation of the University's Code of Conduct, and/or liable under Federal and State laws.

Netiquette

Netiquette—or network etiquette—is the socially and professionally acceptable way to communicate on the Internet. Please abide by these guidelines of "netiquette" when using online communication tools with your classmates and me:

- Identify yourself. Begin messages with a greeting and close with your name.
- Avoid sarcasm. It can be misinterpreted and cause hurt feelings.
- Keep the dialog collegial and professional. Some discussion topics may be controversial.
- Do not flame - These are outbursts of extreme emotion or opinion.
- Think twice before you submit a response. You cannot always edit or delete your posts once they have been submitted.
- Do not use offensive language or profanity.
- Use clear subject lines for your posts.
- Do not use all caps. It is the online equivalent of YELLING!
- Avoid using abbreviations or acronyms - like FDA, CDC, etc. - unless you are confident the entire class knows them.
- Use emoticons (https://en.Perusalpedia.org/Perusal/List_of_emoticons) to clarify your emotions. They add context to your words that cannot be seen otherwise. :)
- Be forgiving. Anyone can make a mistake.

I reserve the right to remove any post that does not abide by these guidelines. Please refer to the RIT Student Code of Conduct for a full list of student conduct expectations. (<https://www.rit.edu/academicaffairs/policiesmanual/d180>)

Diversity, Inclusion, and Respect

It is our intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. Diversity can refer to multiple ways that we identify ourselves, including but not limited to race,color, national origin, language, sex, disability, age, sexual orientation, gender identity, religion,creed, ancestry, belief, veteran status, or genetic information. It is our intent to present materials and activities that are respectful of diversity, and your suggestions are encouraged and appreciated. Please let us know about any ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, please let us know about any conflicts, e.g. with religious events, so that we can find a solution together.

Each of us is responsible for creating a safer, more inclusive environment. This is also true for any group activities related to this course. Unfortunately, incidents of bias or discrimination do occur, whether intentional or unintentional. They contribute to creating an unwelcoming environment for individuals and groups at the university. Therefore, we encourage anyone who experiences or observes unfair or hostile treatment on the basis of identity to speak out for justice and support, within the moment of the incident or after the incident has passed. If you feel comfortable, please contact us directly. Otherwise, anyone can share incidents using the following resources:

Bias-Related Incident Report

Confidential Support and Resources

Everyone involved in this course fully supports the Policy P05.0 Diversity Statement that RIT has put forth for all community members. RIT through its policies and practices is responsible for building an inclusive environment where membership in the community allows for faculty, staff and students to reach their fullest potential, both professionally and personally.

Counseling and Psychological Services

Many students at RIT face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation. Located on the second floor of the August Center building (above the Student Health Center), Counseling and Psychological Services provides confidential and personalized services to meet the mental health needs of currently enrolled, undergraduate and graduate students on the Henrietta campus. Our mission is to enhance the RIT student potential for learning and success and to promote the emotional health and well-being of the campus community through:

1. Providing responsive, empirically-based, and culturally competent mental health services that include:

- Short-term individual psychotherapy
- Group counseling and psychotherapy
- Urgent Care crisis intervention
- Assessment and evaluation
- Psychiatric services

2. Providing graduate clinical training in counseling, psychotherapy and college mental health

3. Providing campus-wide consultation and education

Campus Location

2100 August Center, second floor (Currently, all appointments are conducted via phone or Zoom)

Phone: During Business Hours: 585-475-2261

After Business Hours, Weekends/Holidays: 855-436-1245

Fax: 585-475-6548

Email: caps@rit.edu

NOTE: DO NOT USE E-MAIL IN AN EMERGENCY SITUATION, since you cannot be assured that a counselor will open it at your time of need.

Emergency Contacts: