

# BIOL3314-201 General Microbiology

Spring 2025 | MWF 11:00-11:50am | Martin 108

## Instructor Information

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Office Hours: MWF 1:00 – 2:00 pm, TR 10:00 – 11:00 am | other times by appointment

## General Information

### Description

This course is an introduction to the biology of microorganisms including viruses, bacteria, archaea, protozoa, and fungi. Cell structure and function, metabolism, information flow and genetics, evolutionary relationships, and microbial ecology will be covered. A conceptual and experimental background sufficient to enable students to successfully pursue more advanced courses in related fields is provided.

### Core Concepts

The learning outcomes for this course are derived from the six core concepts and 27 fundamental statements identified by the curriculum proposed by the American Society for Microbiology<sup>1</sup>. The five core concepts covered by this general microbiology course are: Cell Structure and Function; Metabolic Pathways; Information Flow and Genetics; Evolution; and Microbial Systems. After completing this course, students will be able to describe how different microbial groups survive and thrive in the varied ecosystems presented to them by nature.

### Purpose of the Syllabus

The purpose of the syllabus is to inform you of course expectations, policies, and content. Ignorance of course policies because you did not read your syllabus will not be an acceptable excuse for not adhering to these policies. Because the syllabus is also available online, you cannot lose it. By accepting this syllabus and remaining enrolled in the course, you affirm that you understand the contents of this syllabus and that you will adhere to its requirements.

### Expectations and Goals

It is expected that you will try your best to understand the material; complete all quizzes, exams, and assignments; ask for help when you need it; and seek to understand why you are in this class (what purpose does it serve to you, your major, and your future?).

### Prerequisite(s)

BIOL 2114 and CHEM 1241/1243, each course with a grade of C or better.

### Co-requisite

The 3-hour laboratory **MUST** be taken with the lecture (you may not take one without the other).

**Note: For the Spring 2025 semester, labs will be virtual (simulations), see below.**

## Required Materials

1. **TEXTBOOK:**

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<sup>1</sup> ASM Curriculum Guidelines, Part I (Concepts and Statements).

**Microbe, 3<sup>rd</sup> Edition** by Swanson, Joyce, and Horak. Wiley, 2022. ISBN 9781683673705

2. **ACCESS TO D2L:** Journal articles, assignments, and other materials including laboratory materials will be posted on D2L, so you need access to it. Any issues with accessing D2L if you are enrolled in the course should be addressed to the IT department.
3. **LABSTER ACCESS:** All lab exercises this semester will be carried out virtually using simulations provided by Labster. An access code must be purchased from the MSU Bookstore. Simulations are accessed in D2L in your lab section page. Starting the first simulation will start the access process, during which you will need to enter your code. This process needs to be done only once.

## Classroom Expectations and Policies:

- Students are expected to be prepared for lecture and lab by: 1) reading the text, lab manual and handouts prior to coming to class; 2) having paper and pen at hand
- Students are expected to arrive a few minutes early to mentally prepare. If late arrival is unavoidable, the student should enter the class in a manner that creates as little disruption as possible.
- Points will be deducted from assignments turned in late.
- Student Conduct: Please refer to the MSU Student Handbook: ([https://msutexas.edu/student-life/\\_assets/files/handbook.pdf](https://msutexas.edu/student-life/_assets/files/handbook.pdf)) for university policies related to student responsibilities, rights and activities. For example, see page 73 for valid grounds for an instructor drop (excessive absence, indifferent attitude, disruptive conduct, failure to meet class assignments), page 13 for the university's code of student conduct and page 55 for definitions of academic dishonesty that may be subject to disciplinary action (cheating, plagiarism, and collusion). In this class, academic dishonesty on an assignment or exam will minimally result in a score of 0 for that assignment or exam. Depending on the magnitude or frequency of these types of infractions, more severe sanctions – including being dropped from the course – will be imposed.
- **CELL PHONES (and other electronic devices): (READ THIS TWICE, PLEASE)** NO cell phones are permitted to be out in this class. This class, as well as your other classes, requires your engagement, and cell phones serve to detract from that engagement. Additionally, your phone should be not only put away, but on “silent” (NOTE: vibrate is NOT silent). If your phone is out and/or in sight, you will be asked to put it away.
- **Other electronic devices: laptops, tablets and similar devices will no longer be allowed to be used during lectures except when used as “electronic paper” to take written notes.** The ability to take good notes is a skill that university students must be able to master. Further, classroom studies have shown that taking notes by hand increases engagement in the material. Simply transcribing the lecture word-for-word is not helpful.
- Students with disabilities: It is the responsibility of the student to first contact Disability Support Services and then the instructor to determine what accommodations might be made for a disability. It will be the responsibility of the student to make arrangements to acquire notes. Any requests for accommodations must be made 2 weeks prior to the first exam.
- The professor considers this classroom to be a place where you will be treated with respect as a human being - regardless of gender, race, ethnicity, national origin, religious affiliation, sexual orientation, political beliefs, age, or ability. Additionally, diversity of thought is appreciated and encouraged, provided you can agree to disagree. Furthermore, guns or other weapons create a coercive environment that is neither safe

nor conducive to learning. Therefore weapons of any kind will not be permitted in my classroom. This includes guns, concealed or otherwise, regardless of licensure. Any student bringing a weapon to class or to lab will be immediately dropped from the course. It is the professor's expectation that ALL students consider the classroom a safe environment.

- In the event that campus is closed due to weather on a date when an exam is scheduled or a homework assignment is due, the exam date or homework assignment due date will shift to the next class period when campus is back open.
- The instructor reserves the right to amend these rules as needed throughout the term.

## E-mail Policy:

I will respond to e-mail during regular school hours (8:30 am – 5:00 pm M-F). I will make every effort to respond to e-mail sent during the week within 24 hours. Those sent over the weekend will be attended to on Monday. Always include a subject line in your e-mail messages. It would be particularly helpful to include in the subject line the course number & section (*i.e.* BIOL 3314). Questions regarding simple matters of class schedule or those that can otherwise be answered from information in this syllabus will be given low priority.

## Attendance Policy:

Students are expected to attend all meetings of the classes in which they are enrolled. Although in general students are graded on intellectual effort and performance rather than attendance, absences may lower the student's grade where class attendance and class participation are deemed essential by the faculty member. In those classes where attendance is considered as part of the grade, the instructor should so inform students of the specifics in writing at the beginning of the semester in a syllabus or separate attendance policy statement. An instructor who has an attendance policy must keep records on a daily basis. The instructor must give the student a verbal or written warning prior to being dropped from the class. Instructor's records will stand as evidence of absences. A student with excessive absences may be dropped from a course by the instructor. Any individual faculty member or college has the authority to establish an attendance policy, providing the policy is in accordance with the General University Policies. [MSU Student Handbook, p. 61]

Absences will be excused for:

- Death of an immediate family member.** An immediate family member is considered to be a grandparent, parent, sibling, spouse, in-law, aunt, uncle, or child.
- Summons to appear in court or jury duty.** A copy of the summons is required.
- Call to military service.** A copy of your orders to report is required.
- University sponsored event.** Members of athletic teams, college bowl participants, etc. will be excused with proper notification.
- Debilitating illness or disability.** Illnesses will be addressed on an individual basis. If a student is affected by an illness that is not debilitating, (*i.e.* flu, virus infection) which may result in the student missing one or more consecutive class sessions, that student will be marked as unexcused for the amount of days missed **unless a doctor's note is provided.**

ROUTINE APPOINTMENTS, medical or otherwise, AND VACATION TRAVEL ARE NOT ACCEPTABLE reasons for excused absences.

**If you feel ill** (esp. with signs and symptoms of COVID-19): Stay Home and Isolate yourself. Inform your instructor of your circumstances.

It is the responsibility of the student to obtain notes or other information covered in class during an absence.

## Exam Policies:

No make-up exams will be given in this course. If you must miss class during a midterm exam period, and it is an excusable absence (see above), then the cumulative portion of the final exam will be used to determine the missed midterm score. You must notify the instructor of problems **prior to** the start of the exam, and provide the appropriate documentation as soon as possible. Only one midterm exam will be substituted for in this manner.

Exams are not moved for congested midterm or finals schedules.

## Grading:

All exams and assignments count toward your final grade in the course and so it is important to do the best that you can on everything you turn in. If you find yourself having difficulties, please come to me for help early in the semester so that you give yourself time to improve.

Attendance is not a direct component of your course score. However, continual tardiness – and the subsequent class disruption due to coming in late – will be taken into account and may have an effect on your final points awarded. As stated above, cell phone use distracts from attention in class. Therefore, students who persist in using their mobile devices during class, except for designated classroom activities, will be marked as absent.

This course is not graded on a traditional curve. The course is worth 1000 points. Grade categories and equivalent percentages are as indicated: A (90-100%); B (80-89%); C (70-79%); D (60-69%); F (59% and below). Passing requires 60% of the points (unadjusted) for the course, or 480. Fractional percentages will be rounded at the end of the semester.

Lecture constitutes approximately 60% of the BIOL 3314 grade. There will be three midterm exams, each worth 90 points. The final exam will be worth 180 points. Each exam, including the final, will focus on what was covered since the previous exam. However, each exam will also be cumulative in that each section of the course builds on what came before. The final will also be more typically cumulative in that it will cover the entire semester, focusing on material that needs to be reviewed (*i.e.* the majority of the class got it wrong the first time around). In addition to the exams, there will be three reading assignments based on papers from the primary literature that we discuss in class. The first paper discussion will introduce reading a primary research article. The next two will include a graded assignment (45 points each). Finally, there will be three video-based homework assignments (20 points each).

Lab constitutes approximately 40% of the BIOL 3314 grade. As mentioned above, lab exercises will be done as simulations in Labster. There are 30 simulations (10 points each). Two or three simulations are assigned for each week, starting week 2. The week's simulations will be due that Friday by 11:59 pm. Simulations can be completed after the due date for 1/2 credit. Depending on how renovations to Bolin go, I am hoping to be able to have in-person lab sessions for part of the semester—perhaps after Spring Break.

Also associated with lab are two other assessments. The first relates to the **Undergraduate Research and Creative Activity Forum**, held each semester. In this Forum, students present their research findings or creative works. For this assignment, students will **critically evaluate**

three (3) poster presentations or three (3) oral presentations (or combination thereof). Satisfactory completion of this assignment will be awarded 30 points towards your laboratory/course grade.

The final assessment is class participation. Should we be able to have in-person lab sessions, this assessment will cover lab participation and following safety procedures. However, it also includes participation in lecture, comprising regular attendance, participation in class discussion (esp. over the papers), etc. Each student starts the semester with full points (70). Points are deducted for lack of participation or not following lab procedures (as applicable).

**Note:**

- 1) No regrades will be provided for exams done in pencil.
- 2) Misspelled words (esp. organism names) and incorrect taxonomic nomenclature will result in ¼ point deductions for each instance.

### Assignment Summary:

|                        |                            |
|------------------------|----------------------------|
| Midterm exams:         | 270 points (3 x 90 points) |
| Final Exam:            | 180 points                 |
| Reading/Paper Analysis | 90 points (2 x 45 points)  |
| Homework assignments   | 60 points (3 x 20 points)  |
| Laboratory:            | 400 points                 |
| Total:                 | 1000 points                |

### Important Dates (Spring 2025):

|                              |  |
|------------------------------|--|
| Classes begin:               | January 22                                     |
| <b>Midterm Exam 1:</b>       | February 17                                    |
| Spring Break:                | March 10 – March 14                            |
| <b>Midterm Exam 2:</b>       | March 19                                       |
| Holiday Break (no classes):  | April 17-18                                    |
| <b>Midterm Exam 3:</b>       | April 14                                       |
| Last day to drop with a “W”: | April 30 (4:00 pm)                             |
| Classes end:                 | May 9  |
| <b>Final Exam:</b>           | May 12 ( <b>Monday</b> ) (10:30 am – 12:30 pm) |

## (Tentative) Lecture Schedule

| Week | Date           | Topic (Chapter)  | Pages                   | Assignment  |
|------|----------------|--|-------------------------|---|
| 1    | Jan 20         | <b>No Class – MLK Jr. Day</b>  |                         |   |
| 1    | Jan 22 – 24    | Intro (Course); Concept Inventory  | (1 – 20)                |   |
| 2    | Jan 27 – 31    | Microscopy (Ch 2); Cell Structure: External (Bact & Arch) (Ch 2)                       | 23 – 49                 |   |
| 3    | Feb 3 – 7      | Cell Structure: External (Eukaryotes)<br>Cell Structure: Internal (Bact & Arch) (Ch 3) | 23 – 49;<br>53 - 69     |   |
| 4    | Feb 10 – 14    | Cell Structure: Internal (Eukaryote)<br>Virus Structure (Ch 17); <b>Paper 0</b>        | 53 – 69;<br>415 - 432   | <b>Paper 0 Discussion (2/14)</b>                            |
| 5    | Feb 17 – 21    | <b>Exam 1 (Ch 2, 3, 17);</b><br>Growth (Ch 4)  | 73 - 95                 | <b>Homework 1 Due (2/21)</b>                                |
| 6    | Feb 24 – 28    | Metabolism (Ch 5);<br>Energetics (Ch 6)  | 97 – 112;<br>115 - 141  |   |
| 7    | Mar 3 – 9      | Energetics (Ch 6);<br>Synthesis (Ch 7)   | 115 – 141;<br>145 – 179 |   |
| 8    | Mar 10 – 14    | <b>No Class – Spring Break</b>   |                         |   |
| 9    | Mar 17 - 21    | <b>Paper 1; Exam 2 (Ch 4,5,6,7);</b><br>Microbial Envelope (Ch 9)                      | 213 - 232               | <b>Paper 1 Discussion (3/17);<br/>Homework 2 Due (3/21)</b> |
| 10   | Mar 24 – 28    | Microbial Envelope (Ch 9);<br>Information Flow (Ch 10)                                 | 213 – 232;<br>235 - 266 | <b>TX-ASM (3/28)</b>  |
| 11   | Mar 31 – Apr 4 | Information Flow (Ch 10);<br>Succeeding in the Environment (Ch 12)                     | 235 – 266;<br>293 – 322 | <b>Paper 1 Due (4/4)</b>                                    |
| 12   | Apr 7 – 11     | Succeeding in the Environment (Ch 12); <b>Paper 2</b>                                  | 293 - 322               | <b>Paper 2 Discussion (4/11)</b>                            |
| 13   | Apr 14 – 16    | <b>Exam 3 (Ch 9,10, 12);</b><br>Reproduction (Ch 4 & [14,15,16,17,18])                 |                         |   |
| 12   | Apr 18         | <b>No Class – Holiday Break</b>  |                         |   |
| 14   | Apr 21 – 25    | Reproduction;<br>Element Cycles (Ch 20)  | 505 – 534               | <b>Homework 3 Due (4/25)</b>                                |
| 15   | Apr 28 – May 2 | Element Cycles (Ch 20);<br>Interactions (Ch 21)  | 505 – 534;<br>537 – 567 | <b>Paper 2 Due (4/28)</b>                                   |
| 16   | May 5 - 9      | Interactions (Ch 21);<br>Concept Inventory   | 537 - 567               |   |
|      | <b>May 12</b>  | <b>Final Exam (10:30 am – 12:30 pm)<br/>Midterm 4 + Comprehensive</b>                  |                         |   |

## Tentative Schedule of Laboratory Simulations

| Week | Date<br>(week of) | Simulations  | Due by: |
|------|-------------------|--|---------|
| 1    | Jan 20            | <b>No simulations scheduled</b>  |         |
| 2    | Jan 27            | Lab Safety<br>Aseptic Technique<br>Microscopy  | Jan 31  |
| 3    | Feb 3             | Confocal Microscopy<br>Fluorescence Microscopy<br>Building Gram+ & Gram- Cell Walls                              | Feb 7   |
| 4    | Feb 10            | Bacteria Cell Structures<br>Gram Stain: Stains & Counterstains<br>The Gram Stain                                 | Feb 14  |
| 5    | Feb 17            | Bacterial Growth Curve<br>Bacteria Quantitation by Culture   | Feb 21  |
| 6    | Feb 24            | Using the Gram Stain to Help Diagnose Meningitis<br>Bacterial Isolation<br>Identification of an Unknown Bacteria | Feb 28  |
| 7    | Mar 3             | Pipetting: Selecting & Using<br>Pipetting: Master the Technique  | Mar 7   |
| 8    | Mar 10            | <b>No simulations scheduled – Spring Break</b>   |         |
| 9    | Mar 17            | Spectrophotometers<br>Spectrophotometry: the Beer-Lambert Law  | Mar 21  |
| 10   | Mar 24            | SDS-PAGE<br>Western Blot   | Mar 28  |
| 11   | Mar 31            | Genetic Transfer in Bacteria<br>ELISA  | Apr 4   |
| 12   | Apr 7             | Bacterial Shape & Movement<br>Gel Electrophoresis  | Apr 11  |
| 13   | Apr 14            | Counting Cells<br>PCR (Polymerase Chain Reaction)  | Apr 18  |
| 14   | Apr 21            | Control of Microbial Growth<br>Pasteurization<br><b>Attend Celebration of Scholarship (Thurs, 4/24)</b>          | Apr 25  |
| 15   | Apr 28            | Next Generation Sequencing<br>Biosafety  | May 2   |
| 16   | May 5             | <b>No simulations scheduled</b>  |         |